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Regional Insect Control Project



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RICP
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report

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REGIONAL

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United States Department of Agriculture

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Agricultural Research Service

INSECT

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Plant Pest Control Division

in special agreement with

CONTROL

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- H > Agency for International Development

Washington, D. C.

PROJECT

Regional Headquarters

Beirut, Lebanon

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REGIONAL INSECT CONTROL PROJECT
PERSONNEL 1964

Staffing	Name	Remarks
<u>Washington, D. C.</u>		
Asst. to Dir. Foreign Tech. Programs, PPCD, ARS	Edson J. Hambleton	1/1 - 3/29 (RICP 1951 - 1964)
Assistant Director PPCD, ARS	Leo G. K. Iverson	3/29 - 12/31
<u>Beirut, Lebanon</u>		
Coordinator	Roland Q. Gardenhire	1/1 - 4/7
Coordinator	Wilbert O. Ridgway	4/8 - 12/31
Reg. Plant Quar. Spec.	William H. Pierce	
Entomologist	Charles R. Brown	6/7 - 12/31
Administrative Officer	Joseph J. Zeglen	
Secretary	Willie Jo Vickers	
Secretary	Lisa Katmerian	
<u>Kabul, Afghanistan</u>		
Entomologist	Edward R. Millet	
<u>Addis Ababa, Ethiopia</u>		
Entomologist	Philip M. Schroeder	
Entomologist	Duane E. Bartholf	
Chief Pilot	Calvin C. Franklin	6/3 - 12/31
Pilot	Charles A. Temple	
Pilot	Donald A. Davis	
Pilot	Jack W. Miller	
<u>Asmara, Ethiopia</u>		
Entomologist	Wilbert O. Ridgway	1/1 - 3/2
<u>Tehran, Iran</u>		
Entomologist	Shannon W. Wilson	
Pilot	Calvin C. Franklin	1/1 - 6/2
Pilot	James C. Courtright	10/18 - 12/31
<u>Khartoum, Sudan</u>		
Entomologist	Arthur Kaatz	
Pilot	Ned R. Powers	
Pilot	Carl A. Shipman	
Pilot	Arthur T. Wolfe	3/26 - 12/31
<u>Ankara, Turkey</u>		
Entomologist	Flournoy M. Philips	

ELEVENTH ANNUAL RICP CONFERENCE, BEIRUT, NOVEMBER 2 - 6, 1964



LEFT TO RIGHT

STANDING

PIERCE
FRANKLIN
WILSON
COURTRIGHT
PHILIPS

POWERS
RIDGWAY
IVERSON
MILLET
DAVIS

SHIPMAN
BARTHOLF
BROWN

LOWER ROW

WOLFE
ZEGLEN
TEMPLE
SCHROEDER

MILLER
KAATZ

Regional Insect Control Project

SUMMARY OF ACTIVITIES 1964

Introduction

The Regional Insect Control Project (RICP) maintained a normal course of activities during the year without any unusual emergency situations occurring anywhere in the region. The Regional Aerial Unit, located in East Africa, continued to function as a mobile unit for any insect pest emergency within the RICP region. RICP entomologists, the plant quarantine specialist and airplane pilots continued to give technical assistance in all phases of plant protection. The range of training assistance given varied from the most elementary level to highly specialized fields depending upon the type of request from the cooperating countries of the Middle East and Africa.

Personnel changes within RICP were implemented without any disruptions of activities. Mr. W. O. Ridgway transferred to Beirut from Asmara, Ethiopia in April, 1964 to become Regional Coordinator, replacing Mr. R. Q. Gardenhire who returned to the parent organization of RICP, the Plant Pest Control Division of Agricultural Research Service (ARS) in the United States. Mr. Ridgway has been intermittently associated with RICP activities in Africa and the Middle East since 1952. Upon the retirement of Mr. E. J. Hambleton, Assistant to the Director of Plant Pest Control (Foreign Technical Programs), Mr. L. G. K. Iverson, Assistant Director, Plant Pest Control Division, assumed the duties for liaison between USAID and RICP in Washington.

The program guidance given by Mr. Hambleton to RICP activities will be gratefully remembered. He had been active in the project from its inception as a small sector of foreign technical assistance of the United States Mutual Security Program.

During the year the Regional entomologist position in the Beirut headquarters office was filled by Mr. C. R. Brown and the airplane pilot position in Iran by Mr. J. C. Courtright.

All RICP activities were closely coordinated with the programs of the various USAID Missions in the countries where project personnel were assigned. Requests by Governments or by USAID Missions for temporary duty assignments were carried out promptly by available personnel.

Desert Locust Situation and Control

The overall level of desert locust populations remained low during 1964. Only scattered adult desert locusts and limited breeding, mostly of the solitary phase, was reported from areas normally liable to infestations. At present the area of greatest concern is the India-Pakistan border. Here scattered breeding during the last half of 1964 produced the first locust swarms of alarming proportions since 1962. This vast potential breeding area may foster swarms that could spread infestations throughout the desert locust area. RICP cooperated with regional locust and national

organizations in conducting aerial reconnaissance flights for locusts in eastern Africa. Reconnaissance flights, based on past historical records, were scheduled for areas where locusts were considered most likely to be present.

Training Program

Training of nationals in all phases of plant protection again held high priority as one of the most important functions of RICP personnel. Instructions were given by RICP personnel in the various countries for spray pilots and mechanics, insect collecting and survey, insect and plant disease control, and plant quarantine and fumigation procedures. Most of this program was directed toward extension service and plant protection personnel. Many of these have had training outside of their respective countries, subsequently returning as instructors. RICP entomologists selected country Plant Protection personnel and recommended specific itineraries for USAID sponsored participant-training programs in the United States.

Insect Pest Survey and Detection

Emphasis continued to be placed on insect pest survey and detection as an important key to economical and successful agricultural pest control. Several countries are now beginning to develop their own insect museums to house reference material which can be consulted quickly. They are also establishing distribution records of some of their major economic agricultural insect pests. Plant Protection personnel are becoming more aware of the need for accurate evaluation surveys to follow up on reported infestations from rural areas.

Plant Quarantine

RICP has received several requests for the assistance of the Plant Quarantine Specialist. This is an indication that many countries are becoming aware of the need for phytosanitary measures to meet international demands and increase market values. Technical assistance was given by the Regional Plant Quarantine Specialist on the following: plant quarantine regulations, enforcement, inspections, fumigation procedures and techniques, harvesting and storing sanitation practices, and fumigation facilities.

Temporary Duty Assignments

Temporary duty assignments were carried out promptly by RICP personnel when requested through USAID Missions or when technical backstopping of active programs was requested by RICP country entomologists. Some of these assignments were as follows: a plant quarantine evaluation study in Ghana; an agricultural pilot-training assignment in Syria; some aerial application experiments and the fitting out of an Iranian Air Force multi-engine aircraft with spray equipment; training of pilots in spraying techniques with this aircraft in Iran; a requested AID/Washington evaluation study of the agricultural aerial spray unit in India by Mr. Arthur Gieser, Agricultural Aviation Consultant of the Plant Pest Control Division, USDA.

RICP Regional Aerial Unit

The Regional Aerial Unit, with headquarters in Ethiopia, continued to act as a mobile "fire brigade" to combat outbreaks of agricultural pests, particularly desert locusts, anywhere throughout the Middle East and Africa. It gave support to the Desert Locust Control Organization for East Africa (DLCOE) and supported the pilot and mechanic training activities in all countries where RICP is active. The unit carried out methods improvement activities pertaining to aerial applications, gave assistance in aerial search and rescue activities, and provided emergency transportation in such cases where the use of small aircraft was necessary. During the latter part of 1964 a twin-engined C-47 airplane, equipped for spraying, was added to the existing fleet of aircraft. It is presently based in Ethiopia.

Attendance at Meetings and Conferences - 1964

RICP was represented in Rome, Italy at the Twelfth Session of the FAO Technical Advisory Committee (TAC) on Desert Locust Control, a Special Session of the TAC, and the Ninth Session of the FAO Desert Locust Control Committee. An RICP representative held chair positions in both of the regular sessions of these committees. RICP also was represented at three regular sessions of the DLCOE meetings held in Ethiopia, the Somali Republic and the United Republic of Tanganyika and Zanzibar. The Eleventh Annual Conference of the RICP Staff was held in Beirut for discussions and compilation of this report.

During 1964 the RICP Coordinator visited all of the countries in which cooperative USAID/RICP programs are established to discuss and observe program activities. More than one visit was made to some countries to discuss special aspects of their program.

Comments

The increased interest in more varied pest problems, closer coordination of all agricultural activities within a given country and the more highly specialized type of assistance being requested by some countries indicates a progressive trend in the developing countries. The control of economic insect pests to increase food production and improve food quality is no longer dependent on USAID commodity assistance programs in most RICP countries. The local personnel, now being reinforced by returning trainees, are in a much better position to utilize fully the available equipment, manpower and technology.

One of the greatest needs in plant protection activities is technical assistance in the organization and management of existing personnel and equipment.

SUMMARY OF ACCOMPLISHMENTS 1964

During 1964 the 20 technicians of the RICP regional staff serviced 14 different countries of the Middle East and Africa and held

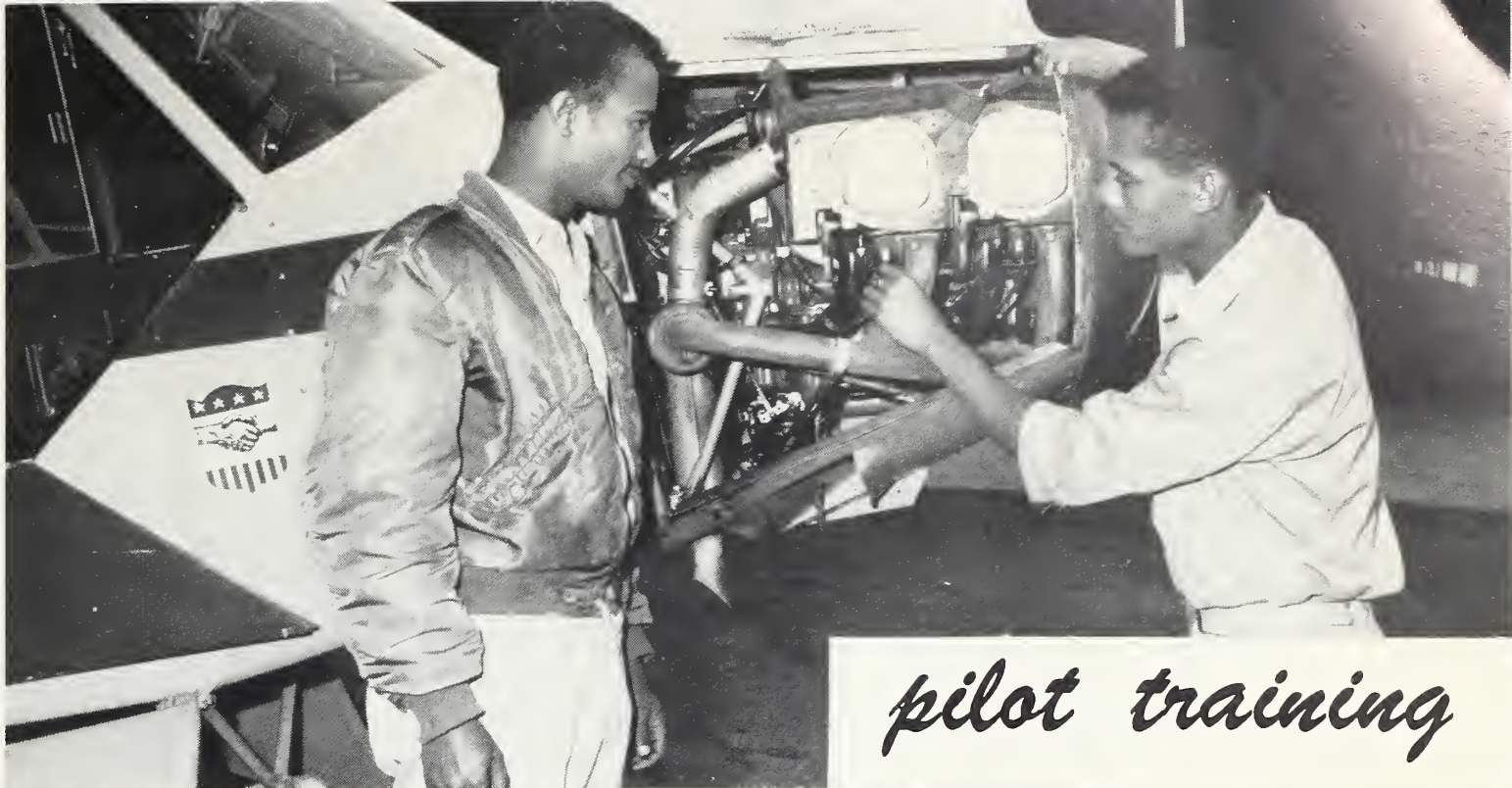
23 training sessions reaching
 673 plant protection personnel. In addition pilot mechanic
 training was given to
 71 participants and
 27 participant trainees were selected for training in programs
 in the U. S. or other countries.
 84 aerial and ground demonstrations were made by RICP and
 Ministry operations against
 54 pests on
 1,698,200 trees and
 542,237 acres of crops and
 224,000 cubic feet of grain storage space.
 313 Ministry and RICP desert locust reconnaissance flights were
 conducted totaling
 1,048:8 hours of flight time.
 Ministry and RICP aerial units conducted control demonstra-
 tions on
 7,435 acres of water hyacinth. They also conducted
 51 flights totaling
 173:50 hours flight time on water hyacinth survey. RICP pilots
 instructed
 65 students in pilot-mechanic training programs, and
 7 additional trainees were sent to outside countries for
 further training.

These activities resulted in imports by RICP-program countries of

5,782 hand operated spray applicators,
 13,334 power operated spray applicators,
 55 vehicles,
 5 airplanes,
 116 semi-portable radios,
 344.98 tons and
 2,019.52 100 gallon lots of pesticide from the U. S., plus
 34,494.51 tons and
 10,019.50 100 gallon lots of pesticides from other sources.

This work was supported by

\$ 134,030 of USAID money,
 576,400 RICP funds and
 14,599,804 host country plant protection expenditures.
 Thus making approximately
 20.55 dollars local currency equivalent used for each U. S. \$1.00
 expenditure.



pilot training



REGIONAL INSECT CONTROL PROJECT 1964

AFGHANISTAN.

E. R. Millet

Background

The Regional Insect Control Project (RICP) activities in Afghanistan continued to be predominately of an advisory nature. The Afghanistan Plant Protection Service concentrated most of its efforts on conducting insect and disease control operations on Ministry of Agriculture farms and gardens. Several of the plant protection personnel are studying in other countries and will be away from Afghanistan for one or two years. Upon return these employees will fill important positions within the Plant Protection Service.

Early in 1964 a work plan, to be carried out on a calendar month basis, was drawn up and signed by the RICP Entomologist and the Ministry Plant Protection personnel. The RICP Entomologist presented a plan for the reorganization of the Plant Protection Service in order that the existing trained personnel be allowed more latitude for efficient operation.

The FY-65 commodity budget for the USAID/Afghanistan Plant Protection Project has been set at U.S. \$3,600, but none of this was committed for project commodities. The Afghanistan Ministry of Agriculture's Plant Protection Service budget for the year was U.S. \$43,600 of local currency. An amount equivalent to \$27,000 U.S. currency was also appropriated by the Afghanistan Government for the purpose of making foreign purchases. The total Plant Protection budget for the year was U.S. \$70,600. This is a 39 percent budget reduction over last year's budget due to the lack of the appropriation of locust funds.

Important Accomplishments During 1964

General

Some control of tree borers was attempted by the Ministry of Agriculture by cutting and destroying dead trees and limbs of affected shade trees in Kabul during the winter.

Two American-trained plant protection officials were promoted to Provincial Director of Agriculture positions in Kabul and Kapisa Provinces.

A Plant Protection Agent was permanently assigned to Kandahar to conduct plant protection activities in that Province.

Demonstrations

Control demonstrations were conducted during spring, summer and fall in the Ninghar Province. These applications were made on approximately 5000 citrus trees, using endrin and oil emulsion, for the control of four major citrus insect pests. Spraying of apple, peach, almond and

apricot trees in Shebarghan Province with DDT and malathion proved successful against the black-veined white butterfly.

Successful control of the corn ground beetle on wheat in Ghazni and Parwan Provinces with BHC dust was demonstrated. This pest was reported for the first time in Afghanistan this year.

Control of aphids on fruit trees as well as whiteflies and leaf-miners on citrus was conducted for the first time in Paktia Province. No previous plant protection activities have ever been attempted in this Province.

In Badakshan Province some spraying of fruit and shade trees and vegetables was carried out. This is another Province where very limited pest control activities have occurred in the past.

Survey and Quarantine

A comprehensive survey for senn pest was conducted in Maimana Province by a former participant trainee who recently returned from the United States. This survey emphasized the value of the AID participant training program.

The RICP Entomologist conducted a training school for extension agents in the Helmand Valley in the spring. As a result of this training these agents were able to conduct an intensive, accurate survey and population counts of spiny bollworm in cotton this year.

In early October a survey, extending from the Helmand Valley to Kabul, was made for marsh flies of the Family Sciomyzidae. This survey resulted in the finding of four species of these flies in Afghanistan. Some of the larvae of this family are predacious on the intermediary snail-host of the liver fluke in sheep and cattle. Liver flukes infest an estimated 90 percent of the sheep and cattle in Afghanistan, and account for a 20 to 30 percent annual loss of these animals. This study will continue with the possibility of introducing a species of a Sciomyzid which may prove to be a more effective killer of snails than the native predatory species.

The Ministry of Agriculture experienced difficulty in their attempt to export cotton and cotton seed from the Helmand Valley area. This brought about a renewed interest in developing a national quarantine law to expedite cotton and other agricultural export enterprises.

Training

An eight-day short course and seminar was given to forty three Plant Protection and Extension Agents in Kabul during March. Twenty four of the most important agricultural insect pests were discussed thoroughly with the group. Lectures on survey, quarantine, insecticides and equipment maintenance also were presented. Slides, movies and charts,

pertinent to the subject, were shown during the sessions. During March, a similar six-day course was given to twelve extension agents in the Helmand Valley at Bost. Emphasis was placed on survey methods and control techniques for insects found in the Helmand Valley area.

On-the-job training of plant protection personnel continued in the usual manner during the year.

Outlook and Future Plans

Under the new FAO Commission for controlling the desert locust in the eastern region, FAO has planned a thorough two-month survey and mapping of possible locust breeding areas in the southern desert portions of Afghanistan. RICP has been requested to participate in this activity which is scheduled for Mid-April to Mid-June of 1965.

The Plant Protection Service has plans to initiate a 3-year program of extensive control of mildew and anthracnose of grapes in Kandahar and Kabul Provinces in the early spring of 1965. The RICP Entomologist has been asked to advise and help on this program.

The RICP Entomologist will continue to provide technical backstopping for Plant Protection Service.

REGIONAL INSECT CONTROL PROJECT, 1964

ETHIOPIA

P. M. Schroeder

Background

On December 31, 1961 all cooperative projects in agriculture between USAID/Ethiopia and the Imperial Government of Ethiopia were curtailed. This reduced plant protection activities to some extent.

Important Accomplishments During 1964

The Ministry of Agriculture continued to be under reorganization. Provincial agricultural officers were appointed for each of the fourteen provinces. The extension service was shifted from Haile Selassie I University to the Ministry of Agriculture. A new Director General of Plant Protection and Production was appointed and his leadership has been extremely valuable.

The Regional Insect Control Project (RICP) Aerial Unit continued the training of two of the four agricultural spray pilots for the Ministry's air unit. Assistance was also given toward increasing the amount of experimental spraying this year.

Desert locust reporting was reviewed. Renewed interest was obtained by developing the cooperation of the National Police, the Ethiopian Air Force and the Ethiopian Air Lines. The United States Government assisted the National Police in obtaining a radio network that covers 80 percent of the country. These facilities will enable desert locust reports to reach Addis Ababa on a daily basis. The Director General of Plant Protection and Production arranged for the construction of two new storage compounds at Dire Dawa and Asmara and pesticides are now under cover at these sites.

Weekly lectures of one to three hours have been given by the RICP Entomologist to Plant Protection personnel for a number of months. These discussions have covered insect control, insect survey and some general entomology. The class numbered about eight to ten trainees depending on their respective work loads. Also given were field demonstrations on the use of insecticides and survey methods. A number of training aids have been placed in the Plant Protection section of the Ministry and have received favorable comment by visitors.

The Ministry of Agriculture has written a national plant quarantine law and is now awaiting approval by Parliament and His Imperial Majesty. There is considerable interest in training plant quarantine personnel.

The largest Ethiopian economic insect list in existence has been made through the cooperation of Mr. Bob G. Hill of the Alemaya Agricultural College and Mr. W. O. Ridgway. This includes a listing of the insect collection at Asmara, Eritrea.

The U. S. National Museum's Taxonomic Unit in Washington, D. C. has been very cooperative and contributed much to assist the insect survey effort.

The Debre Zeit Experimental Farm personnel was helpful in insect survey activities. In addition to building a light trap of their own they also provided men to maintain a number of other approved traps. The RICP entomologist trained three men on insect survey techniques at the Debre Zeit experimental station this year.

RICP and the Extension Service of the Ministry of Agriculture have cooperated in establishing a training program on insect survey and control methods.

The beneficially predatory vedalia beetles have continued to spread on the Alemaya Agricultural College Farm as a result of the successful RICP introduction in 1962.

Outlook and Future Plans

The budget of the Ministry of Agriculture has been increased and USAID/Ethiopia has expanded its participation in agricultural programs. It is hoped that these efforts will result in a more effective plant protection program.

Country work plans outline a continuation in 1965 of the established plant protection activities including plant quarantine work.

X REGIONAL INSECT CONTROL PROJECT, 1964

IRAN

S. W. Wilson

Background

The Iranian Ministry of Agriculture was completely reorganized in 1964 and as a result the three-man committee formerly directing the Pest Control Division was replaced by a Director General. The Pest Control Division is now divided into three units: the Pest Control Division, Plant Quarantine Division and the Pest Control Aerial Unit.

The RICP Entomologist served in an advisory capacity to the Agricultural Extension Service, the Research Institute for Plant Pests and Diseases as well as the Pest Control Division. The RICP Pilot Advisor position was filled in October. Prior to this, problems which required the assistance of a pilot-mechanic were solved by TDY assignments of the RICP Chief Pilot.

In 1964 the Pest Control budget was increased to a local currency equivalent of U. S. \$2,289,000. No USAID/Iran funds were used for pest control in 1964.

Important Accomplishments During 1964

Locust Control

A small swarm of red desert locusts covering an area of 50 hectares was observed in the Jirof area of southern Iran during July. The Pest Control Division controlled this swarm immediately with applications of BHC and Aldrin applied with ground equipment. Reconnaissance in the area produced no further reports of desert locusts.

Other Insect Control

Senn pest (Eurygaster integriceps) infestations were severe in Tehran, Isfahan, Fars, and Loristan Ostans. In addition, smaller areas of infestation occurred in Kurdistan and Gilan Ostans. Migration of the senn pest from the winter hibernating areas in the mountains extended for an unusually long period of time, necessitating an equally extended control program. This control program consisted of the use of eight Ministry Aerial Unit airplanes for treating 80,500 acres, and conventional ground spray equipment for the treatment of 12,432 acres.

Spiny bollworm (Earias insulana) a cotton bollworm (Heliothis armigera) and beet armyworm (Spodoptera exigua) infestations required control in the Gorgan and Darab areas. Extensive control was accomplished by a private aerial operator in the Gorgan area. A total of 67,500 acres was sprayed by the private operator and 36,000 acres by the Ministry

Aerial Unit. Control results were good, with a reported 300 percent increase in cotton production in the Darab area where the Ministry aircraft sprayed.

Sugar beets were attacked by beet armyworms in the Meshed, Isfahan and Fasa areas. These infestations were controlled successfully by Ministry aircraft and ground equipment. A total number of 15,750 acres was sprayed by eight aircraft and 20,250 acres by ground equipment.

Moroccan locust (Docostaurus maroccanus) and local grasshoppers were controlled by ground equipment on 191,000 acres by farmers and the Pest Control Division. Availability of knapsack sprayers and pesticides in many areas of Iran has resulted in widespread controls being conducted on a local level.

Severe infestations of codling moth (Carpocapsa pomonella) occurred on fruits in the Meshed, Tehran, Azerbaijan, and Isfahan areas, but timely control by the Pest Control Division and the local farmers kept damage to less than 5 percent. The Ministry of Agriculture estimated that 2,248,000 trees of all types were sprayed for pest control in Iran.

According to Ministry reports, a broad complex of insects was controlled on pistachio trees in the Kerman, Ghazvin and Damagan areas. This was accomplished for the most part by private individuals.

Survey and Quarantine

The Ministry of Agriculture conducted surveys which contributed greatly to the success of senn pest, bollworm, and beet armyworm control programs. Because of these timely surveys, the control pesticides, equipment and personnel were present when needed. Insect surveys also were conducted on citrus, pistachio, and cereals.

The Plant Quarantine Division staff was strengthened by the addition of five new engineers this year. This should contribute substantially to quarantine operations.

Training and Demonstrations

A total of 178 extension agents was trained in pest control techniques through workshops held this year. Training consisted of pesticide safety, mixing pesticides, spray schedules, pesticide rates, actual spray applications and insect identification.

Aerial Unit

The number of operational aircraft in the Agricultural Aerial Unit is now 24, including the six sprayer-equipped units recently acquired. This, plus the inclusion of four more trained pilots, enabled the Aerial Unit to include additional control programs.

Increased coverage was given to cotton pests this year, and sugar beet pests were included in the Ministry control programs for the first time.

In order to strengthen pilot and mechanic proficiency, five pilots and two mechanics were sent to a school in Pakistan to obtain FAA commercial pilot's and mechanic's ratings. One mechanic was sent to the Piper Aircraft company factory in the United States to receive instruction in aircraft maintenance.

Other

A Government of Iran Air Force C-47 was converted to spray configuration with the assistance and guidance of the RICP Chief Pilot and the RICP Entomologist. An additional C-47 is programmed for identical conversion. In conjunction with the C-47 conversion, training in spraying techniques was given to GOI Air Force crews by the RICP Chief Pilot.

Survey operations conducted in the Persian Gulf date-producing areas revealed an extremely high population level of old world date mite (*Oligonychus afrasiaticus*). A series of experiments were conducted to determine the effectiveness of ultra-low volume spraying techniques utilizing conventional aircraft spraying equipment. The insecticide used was metasystox. The results were inconclusive but gave indications that similar techniques and equipment would be practical for projected date pest control programs in the future. Other similar experiments are planned.

Important New Developments During the Year

The new General Director of the Pest Control Division initiated a program of advanced planning for all pest control programs. This has resulted in expanded activity of the existing programs as well as inclusion of other crop pest control interests such as beets, cereals, cotton, fruits and nuts. An increase in pesticide imports and sales tends to confirm that pest control assistance to farmers has generated increased interest in pest control on the local level.

Outlook and Future Plans

It appears that pest control activities will continue to expand in the future. Aerial control programs are being planned for 1965 and these include locust, cotton, cereals, sugarbeets and date palm projects.

Cooperation between research, pest control and extension agencies and the general up-grading of training and control techniques have been definite factors resulting in an augmented pest control program.

Insecticide shortages, which caused many problems in 1964, should be rectified to a great extent by the pre-planning being conducted by the Pest Control Division. The first of three pesticide formulation plants will go into operation in the spring of 1965. Two additional formulation plants are scheduled for 1966.

The Aerial Unit plans to expand its programs with the addition of six new aircraft next spring. Five student pilots will be hired and a mechanic will be sent to the United States to obtain a FAA mechanic's rating.

X REGIONAL INSECT-CONTROL PROJECT, 1964

SUDAN

Arthur Kaatz

Background

The Plant Protection Division (PPD), Sudan Ministry of Agriculture, activities were as usual during the first five months. Beginning with the first of June activities on all private schemes and cultivations were limited to visits, demonstrations and recommendations for control. Control activities by the PPD were carried out on government schemes and cultivations only after June first, with the exception of those affecting the country as a whole. These were desert locust, tree locust, durra andat bug, stainer bug, cotton insects (survey and insect counts only), cotton residue cleanup, water hyacinth, weaver bird and rat control.

The RICP program is a cooperative activity fully integrated with the regular activities undertaken by the PPD. In addition to technical assistance in plant protection activities, RICP also cooperates in locust control, water hyacinth control and the training of spray pilots for the PPD aerial unit. Activities are conducted under a country-wide work plan coordinated with the Sudan 10-year plan. The PPD operations are country-wide. However, some activities during the present year in the south were limited to plant quarantine and inspection services and water hyacinth control.

The present RICP staff consists of one entomologist, one spray pilot instructor and two pilot instructors. An aircraft mechanic instructor has been under recruitment but the position has not yet been filled.

One expatriate entomologist is employed by the PPD and he is responsible for the cotton insect survey and counts and also for the cotton residue cleanup campaign conducted each season by the PPD.

In addition to this, USAID/Sudan provided RICP administrative backstop- ping and supplied a budget equivalent to U. S. \$62,530 for participant training. RICP provided funds totalling U. S. \$12,500 for pilot train- ing aids and aircraft maintenance tools.

Important Accomplishments During 1964

Locust Control and Reconnaissance

During the first four months of the year aerial reconnaissance flights were made periodically to areas along the Red Sea coast with a history of desert locust outbreaks. Several flights in February were made in cooperation with the Desert Locust Control Organization-East Africa

(DLCOEA). No desert locusts were found. During the summer and early fall months aerial reconnaissance was conducted throughout the Sudan in the summer breeding areas. In July aerial reconnaissance in Kordofan and Darfur Provinces was carried out in cooperation with the DLCOEA. Again no desert locusts were found, but during late September and October a few scattered specimens of solitary stages of desert locusts were found in the Red Sea hills northwest of Port Sudan. These locusts were too few and scattered to warrant control actions. About the same time a small flight of desert locusts apparently passed through Khartoum coming from the western borders and flying towards the Red Sea hills. A flight of desert locusts was reported in the Red Sea hills west of Mohamed Qol by local residents in September, but intensive reconnaissance in that area failed to confirm their presence. Several small bands of mixed desert locust (both solitary and gregarious) hoppers were found in the Baiyuda region south of Merowe in mid-October. These were controlled by joint PPD-RICP participation. After several seasons of below normal populations, the desert locust cycle appears to be on the up-swing again.

In late December 1963 and January 1964 RICP assisted on the PPD tree locust control campaign by successfully conducting aerial spraying in Khartoum, Blue Nile and Kordofan Provinces. It is expected that aerial spraying for tree locusts will resume in late November and December since surveys have located new infestations of scattered and low density populations. PPD conducted ground control activities for tree locusts in Khartoum, Blue Nile, Kordofan and Darfur Provinces at the same time of the RICP aerial activities.

Other Insect and Pest Control

The PPD carried out scale and termite control work on date palm trees in the Northern Province; citrus leaf miner and scale control on a number of government schemes in central Sudan; a durra andat bug campaign in Kassala and Blue Nile Provinces and a cotton stainer bug control campaign in the Nuba Mountains. The regular campaign to control the mealybug-scale complex in Khartoum and Omdurman was continued, as was the control of all crop insects in the Khashm El Girba resettlement project. The PPD carried out a rat control campaign in the Gezira area and a weaver bird control campaign in the durra growing regions. The latter cause great annual losses to the durra crop.

Survey and Quarantine

The PPD conducted surveys on the desert and tree locusts. Additional survey activities were as follows: durra andat bug in Khartoum, Kassala and Blue Nile Provinces; cotton stainer bugs throughout the Nuba mountains; all insects and pests in Khashm El Girba resettlement scheme area to determine potential economic insects problems that might affect the scheme; cotton insects on the Gezira and Blue and White Nile schemes; the annual survey of cotton stalk and the cotton residue cleanup campaign to control bollworms and blackarm disease.

Due to the rising of the Nile waters the Plant Quarantine office and inspection station was moved from its former location at Wadi Halfa to Ed Damer near Atbara in the Northern Province. The northern Nile River branch to Wadi Halfa is now patrolled by a mobile Plant Quarantine Unit from the new headquarters. Most of the agricultural export and import products, subject to plant quarantine inspection, still pass through Port Sudan where the workload has increased this year due to the large amount of foreign trade. Much of the necessary fumigation of agricultural products has been done in holds of ships in order to reduce costs and charges to vessels while loading. The new plant quarantine station at Geneina has been in operation all season except during the two month rainy season when border traffic was reduced. During 1964 Port Sudan handled 9,016 consignments of which 1,634 were inspected by the Plant Quarantine Service, GOS. This resulted in 535 units being treated by fumigation. The treated units represented a variety of agricultural products and were classified as follows: 7 local; 28 import; 500 export. The sum total of inspected shipments was 34,333.2 tons.

Training and Demonstrations

With funds provided by USAID, two Sudanese participants were sent to the USDA Plant Quarantine school in the United States for short term specialized training. Seven Sudanese have completed entomology and plant protection studies in the United States and are presently awaiting further assignment to an American university for graduate level studies. Six Sudanese participants are enrolled in graduate studies in entomology at the University of Arizona. One of these is specializing in locust control research. Two of the six will return to fill PPD/Sudan regional supervisorships upon completion of training in January 1965. The establishment of regional plant protection offices to supervise country-wide plant protection activities is a part of the objectives of the Sudan 10-year plan. This will partially meet the demand for entomologists and scientists created by the rapid growth and expansion of the six-year-old Plant Protection Division.

Under RICP pilot training activity in the Sudan, seven Sudanese received commercial pilot instruction. They also were taught aerial locust control and reconnaissance, water hyacinth control and survey. Four of these studied flight instruction and aerial agricultural spraying methods. A part of the latter course consisted of actually taking part in aerial spraying activities. The PPD has three Sudanese training in West Germany on plant protection methods. They are expected to complete their course by next year.

The RICP entomologist assisted the PPD in conducting a series of tests and demonstrations in the Port Sudan storehouses. These included the use of mist blower and fogging pesticide applicators for the control of stored products pests.

Aerial Unit

The PPD aerial unit now consists of two Piper PA-18 and two Cessna 180 aircraft, both equipped with spray equipment. This is augmented by the RICP aircraft stationed in the Sudan. The PPD has factory ordered one fully equipped Piper PA-18 aircraft which is scheduled for delivery in 1965. The four Sudanese pilots, returned from flight training in Ethiopia, received their FAA commercial pilots certificates in May 1964. One of these pilots also received an FAA Basic ground instructor's rating and is presently acquiring further schooling in advanced agricultural aviation. All four are now taking advanced agricultural aviation and taking part in actual aerial control activities. Three additional students are in training for their FAA commercial pilot's certificate. The PPD has one United States spray pilot employed on their staff. Actual aerial spray training on water-hyacinth was carried on in addition to simulated spraying and reconnaissance flights. Approximately 1,690 hours of flight time was logged; 7,900 acres of water hyacinth were sprayed; 213 reconnaissance flights were made; 3,430 hours of classroom instructions were given to an average of five student pilots; and approximately 2,000 hours of preflight and postflight ground instructions on maneuvers, errors and corrections of flight attitudes were given.

Storage hangars and maintenance shops have been completed at Merkhayat airstrip. A well was drilled for water supply at the airstrip and radio communications were installed. A 10 KW generator has been installed as a light and power source at Merkhayat but is not yet in operation. A meteorological station was set up, and classrooms and storerooms are being constructed as well as underground storage tanks for gasoline. The runways are kept in an excellent condition by PPD airport staff. A manned fire-truck was added during the summer.

Other

On two different occasions RICP assisted in emergency water-hyacinth control activities, and made numerous aerial reconnaissance and survey flights throughout the year along the Nile River system to evaluate the water hyacinth situation. The PPD again this year had a 30-man team with vehicles and supplies working on locust control in the Saudi Arabian peninsula. The PPD sent representatives to Locust Control meetings in West Africa, East Africa and to Jordan during the year. The PPD fumigated most of the cotton seed on sites of ginning plants at Gedaref, Sennar and Khartoum Provinces to assist in the control of the pink bollworm.

Important New Developments During the Year

Although the PPD continues to make the insect counts and insect surveys in the cotton growing regions, the Sudan Gezira Board Block Inspectors are now responsible for the actual control operations in the Gezira. Formerly the PPD staff attended to this matter. A privately established insecticide plant was in operation in the Sudan, formulating many of the pesticides used in control operations this year. The PPD placed in

service a large, fully-equipped mobile workshop to provide field maintenance for vehicles and equipment.

Outlook, Future Plans and Miscellaneous

RICP and PPD are expanding the pilot training program to give basic pilot and advanced agricultural aviation training to five new Sudanese trainees. The PPD plans to establish additional regional offices and plant quarantine stations to provide for plant protection needs. The locust control team has indicated that they will continue to give assistance in Saudi Arabia. RICP and PPD expect to continue working in cooperation with the DLCOEA during the next year on locust reconnaissance flights in the Sudan. PPD hosted the FAO sponsored Middle East Plant Protection Commission meeting at Khartoum early in November.

REGIONAL INSECT-CONTROL PROJECT - 1964

TURKEY

F. M. Philips

Background

The Regional Insect Control Project (RICP) Entomologist has made a practice of preparing work plans each year since 1961. These work plans have usually been agreements between the Turkish Plant Protection General Directorate and the RICP Entomologist in order to realize the most effective utilization of the services of the RICP Entomologist. In 1964, work plans were prepared to satisfy queries made by USAID/T and by RICP. The first year's implementation of the projected Five-Year Plan, prepared by the Plant Protection General Directorate, has been fairly closely adhered to and thus far has all the appearances of being moderately successful.

In 1964, the RICP Entomologist was influential in the preparation of the budget of the Plant Protection General Directorate. The Government of Turkey Plant Protection budget for the Turkish fiscal year 1964 was 78,161,841 Turkish lira (U. S. dollar equivalent \$8,660,204). The proposed 1965 fiscal year budget is 91,417,271 Turkish lira. (The Turkish fiscal year begins March 1).

The USAID/T FY 1964 Plant Protection budget was \$59,000. Of this, \$55,000 was obligated for the training of eleven participants in the United States and \$4,000 for the purchase of commodities from the United States. The FY 1965 USAID/T Plant Protection budget is \$35,000. \$20,000 is for four one-year extensions of taxonomy participants financed from previous years. The remaining \$15,000 is to be used for financing three additional participant trainees in the United States.

Important Accomplishments During 1964

The progress made by the GOT Survey Service and Museum is reflected by the per annum increase in the number of insect species surveyed and submitted for identification. In 1962 there were no insect surveys made on a national scale. In 1963, surveys for four insect species were conducted and about 200 separate collections were submitted to the museum for identification. During 1964, ten additional insect species were added to the survey list and a total of 3,000 separate collections were submitted for identification. Two conferences were held in 1964 to begin the difficult task of developing standardized techniques for insect survey. The first was to determine what insects were the most economically important to Turkey. Ten species were selected. Of these ten, some were known to occur in Turkey but their

distribution was unknown. Of the remaining ones selected, it was unknown whether or not they occurred in Turkey. The participants in the first conference were instructed to submit detailed plans for the surveying of these ten species as soon as possible. From these considerations, a review committee developed standardized survey techniques for the ten selected insects. The subsequent conference adopted the recommended survey standards of the initial meeting. This will be the first time in the history of Turkish agriculture that an accurate comparison of survey results will be possible. The first of two insect survey participants will return from the United States in November 1964. This should create an even greater stimulus to the program. Also during the year three insect survey courses were given in which 33 technicians were trained.

The RICP Plant Quarantine Specialist visited Turkey for a three week period during September. He held discussions with Central Treaty Organization (CENTO) officials and Turkish Plant Quarantine officials concerning the possibility of conducting a CENTO sponsored plant quarantine seminar-training course. Inspections of quarantine facilities were made at Izmir, Istanbul, Samsun and Gerisun. In Gerisun, observations were made of quarantine procedures employed for shipment of hazelnuts to Germany. One of the major accomplishments in Plant Quarantine in Turkey this year was the modification of the regulation concerning the import of crop seeds. Under the former regulation the accompanying phytosanitary certificate stated: "The plants have been inspected several times during the growing season and found to be free from harmful viruses". Under the new regulation the certificate statement has been changed to read: "The seeds have been inspected and are apparently free from harmful viruses". This change was motivated by several conferences held by the RICP Entomologist and GOT officials.

Several shipments of Turkish fig paste have been rejected in the United States because they were found to exceed the U. S. Food and Drug Administration's tolerances for contamination by insects or insect parts. The fig moth larva was the primary offender along with various stored product pests. These rejections constituted a serious threat to an important source of foreign exchange for the Turkish Government. Conferences were held whereby plans were formulated to prevent fig moth infestations and the subsequent revenue loss. It was determined that the practice of night drying figs in the open allowed considerable contamination exposure to egg laying by this nocturnal moth. It was recommended that the fig drying trays be covered at night, and this reduced considerably the infestation hazard.

The GOT requested a fumigation specialist for khapra beetle from FAO for a period of 90 days. Mr. W. M. Ring, Assistant State Supervisor, PPCD, for the State of Michigan, was recruited for this assignment. He is presently inspecting storage facilities and training personnel to conduct surveys, controls and methods of implementing a khapra beetle quarantine.

Tobacco Blue Mold (Peronospora tabacinae) caused practically no damage in Turkey during 1964. Through the alertness and industry of the Plant Protection General Directorate and the cooperation of the farmers and other GOT agencies, tobacco blue mold was held under strict control. Instead of using zineb exclusively, as has been the control practice in the past, the GOT has selected methyl maneb to give better control and longer residual effect. Zineb is still being used in the seedbeds. In 1964 the Turkish farmer was required to buy his own fungicides and the GOT loaned spray equipment to those farmers not owning such apparatus. In 1965 the farmer will be expected to provide his own equipment.

Training courses were conducted at seven locations in Turkey to train Plant Protection agents in insect survey, apple insect control, tobacco blue mold control and seed treatment for controlling loose smut on wheat. A total of 378 persons received training in these courses.

RICP's original plans to phase-out in June 1966 have been altered by a GOT request to USAID/T for an earlier termination date. GOT has indicated June 1965 for this purpose and noted an interest in obtaining RICP-TDY consultant services in the future.

In September and October, a large-scale reorganization took place within the Ministry of Agriculture. Thus far five General Directors have been replaced, including the Director General of Plant Protection. Since the new Plant Protection General Director has taken over, the only changes of note are the replacement of the Deputy General Director and the Assistant General Director. At the present time it is not possible to anticipate additional changes.

It is anticipated that the Turkish Plant Protection General Directorate will have attained a self-sustaining high level of competency by June, 1965. After this date no further full time RICP assistance is planned.

X REGIONAL INSECT CONTROL PROJECT ⁴ 1964

REGIONAL AERIAL UNIT, X

D. E. Bartholf

Introduction

The Regional Insect Control Project Aerial Unit, based in Ethiopia, has worked in support of the Ethiopian Ministry of Agriculture and the Desert Locust Control Organization for Eastern Africa (DLCOEA).

The present desert locust recession in East Africa was brought about to a great extent by the past control programs spearheaded by the RICP Aerial Unit.

Eastern Africa lies in the path of the migratory desert locust. Experts on the habits and migration routes of the desert locust long ago suggested the theory that if the international locust migration chain could be broken, locust populations would be reduced to a minimum. This has happened for Africa is now experiencing the longest desert locust recession in recorded history.

Important Accomplishments During 1964

A number of small aerial spray demonstrations were conducted during the year. The total number of acres sprayed was 3,860. These demonstrations, using various insecticides and dosage rates, served a dual purpose. They gave the Ministry of Agriculture and RICP the information of what insecticide and rates of application would control a specific insect pest under Ethiopian conditions. This served to impress upon the Ethiopian farmer the benefits of an insecticide application program. This year Ethiopian farmers have made many requests to the Ministry of Agriculture for aerial applications of insecticides to protect their crops from infestations of armyworms and local grasshoppers.

Desert locust reconnaissance has played a major role in the activities of the RICP Aerial Unit. Although locust swarms were never detected, they were reported to have been seen by local natives in different areas along the Red Sea coast and in the Rift Valley at various times throughout the year. RICP spent many hours investigating these reports. All flights produced negative results.

One of the most worthwhile projects completed this year in which DLCOEA and RICP correlated efforts was to establish the zones of wind convergence along the Red Sea coast in the Danakil Depression and in the Rift Valley of Ethiopia. It is in these Inter-Tropical convergence zones that the desert locusts tend to congregate, even in their solitary phase.

RICP has proven that these zones, once located, will eliminate to a great extent the time-consuming reconnaissance flights over vast areas of semi-arid terrain. The convergence of air currents result in the accumulation of locust swarms and the development of climatic conditions conducive to locust breeding. Therefore, these convergence areas receive aerial reconnaissance priority. Only during brief periods of the year, when the winds blow indiscriminately, does the whole of East Africa receive full-scale reconnaissance consideration.

This year two Ethiopian student pilots received ground-school classroom instruction, flight training and aerial spraying techniques from RICP instructor-pilots. By mid-September these student pilots had received their Ethiopian commercial licenses and were fully qualified spray pilots. These pilots bolstered the Ethiopian Agricultural Aerial Unit to four fully trained and qualified airmen.

Important New Developments

An important new development during the year of 1964 was the submission of an agreement by member countries of DLCOEA to operate under the framework of United Nation's Food and Agriculture Organization (FAO) under Article XV of the FAO Constitution. When approved by the FAO Council this agreement will offer an opportunity for other government agencies and countries in the region, who are not members of the organization, to cooperate and participate in its activities.

In late October the RICP Aerial Unit received a C-47 aircraft fully equipped with spray gear and with a carrying capacity of one thousand gallons of insecticide. The Aerial Unit now has the mobility and range to cope with any desert locust emergency throughout the desert locust invasion area.

Outlook and Future Plans

Plans for 1965 include the continuing of close support and cooperation in all phases of aerial operations with DLCOEA and with those countries within the scope of RICP. The Aerial Unit will continue to cooperate in the search, detection and control of desert locust swarms and hopper bands in those countries which may request assistance from RICP. Also, as in the past, the RICP Aerial Unit will continue to backstop the pilot-training program in the Sudan.



other projects



+ REGIONAL PLANT QUARANTINE PROGRAM, 1964. +

W. H. Pierce

Background

Plant quarantine functions in most of the Regional Insect Control Project (RICP) countries are gradually moving toward a desired performance level. However, more effort must be directed toward refinement of such items as the importance of plant quarantine, the place of plant quarantine in entry procedures and the inspection and treatment of commodities.

During the year the RICP Plant Quarantine Specialist extended assistance to five countries: Afghanistan, Ghana, Iran, Lebanon and Turkey.

Activities

RICP plant quarantine activities were directed toward assisting participating countries in their efforts to establish and maintain effective and meaningful plant quarantine operations. This was accomplished by reviewing, with country officials, such items as: plant quarantine legislation and regulations; insects and diseases of plant quarantine interests; methods of treatment for plant pests; importance of domestic plant pest surveys; methods of inspection of imports and exports; and the importance of having trained, knowledgeable inspectors.

Afghanistan - The Regional Plant Quarantine Specialist assisted the RICP Entomologist in Afghanistan in presenting two plant protection training courses, one in Kabul, the other in Bost (formerly Kandahar). The major portion of these courses was devoted to plant protection in general with some time allocated for discussion of plant quarantine items. Afghanistan presently has neither a plant quarantine law nor a plant quarantine organization.

Ghana - RICP received a request from USAID/Ghana to advise the Ghana Plant Quarantine Service in several aspects of their operations. The Plant Quarantine Specialist spent the period July 8 to August 15 visiting plant quarantine installations at Kumasi, Takoradi, Accra, Aflao and Paga. He assisted Ghanaian officials in drafting a new quarantine law and regulations. Assistance was offered in other phases of plant quarantine such as fumigation and inspection. One Ghanaian participant was recommended to be sent to the USDA Plant Quarantine School at New York.

Iran - During April a tour was made to the Khorramshar-Abadan area of Iran to review the plant quarantine operations at this important seaport of entry. Several fumigation facilities were visited and discussions were held with plant quarantine officials relative to their

fumigation processes for export of dates, nuts and raisins. Methods and procedures for the inspection of imported products were also discussed at this time.

Turkey - Plant Quarantine activities in Turkey represent a high degree of sophistication and capabilities. The RICP Entomologist in Turkey has worked intensively with Turkish officials on matters pertaining to insect identification and survey, regulations and treatments. His program has been of great assistance to both the plant protection and plant quarantine activities there. The Plant Quarantine Specialist and the RICP Entomologist made one extended trip throughout Turkey and consulted with plant quarantine officials at most of the official ports of entry.

Lebanon - The Plant Quarantine Specialist was requested by the American Embassy, Beirut, to assist the Lebanese Fruit Board in their efforts to meet the phytosanitary requirements of other countries. An informative study was made and the resultant recommendations were presented to the Fruit Board. The fumigation of citrus exports was a major consideration of this report.

Future Plans

Immediate plans call for holding a meeting of the Plant Quarantine and Customs Divisions of the Central Treaty Organization (CENTO) member nations. This includes Turkey, Iran and Pakistan.

The RICP Plant Quarantine Specialist is available for TDY assignments to any of the RICP-host countries for purposes of assisting in either the organizing of courses or the actual training programs in these countries.

WATER HYACINTH CONTROL SUDAN - 1964

N. R. Powers
C. A. Shipman

The water hyacinth, Eichornia crassipes Solms., has been a known Nile River navigational hazard since 1958 when an accumulation of the weed was detected south of Malakal at Bor. Some control spraying was done in 1959 and 1960 at Jebel Aulie Dam 20 miles north of Khartoum. Also in 1960 an aerial survey was conducted along the White Nile River to determine the extent of infestation. There was some experimental spraying in the Malakal area at this same time. Early in 1960 the Water Hyacinth Control Committee was formed under agreement between the United Arab Republic (UAR) and the Government of Sudan (GOS). The GOS committee responsibilities are directed by Plant Protection Division, Ministry of Agriculture.

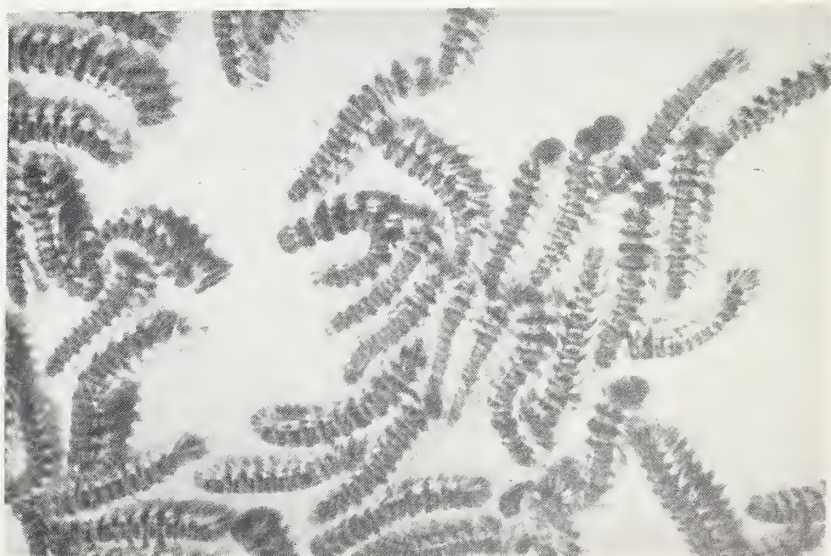
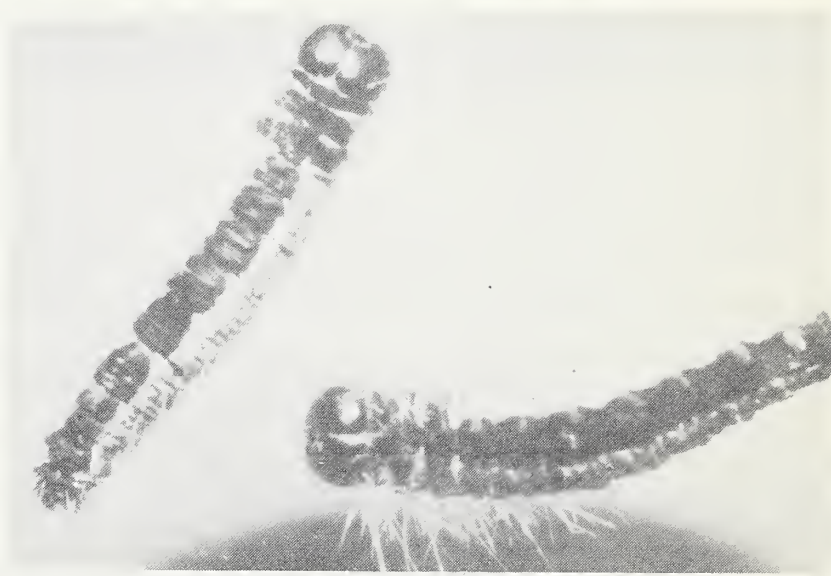
The water hyacinth project budget for the period 1959-60 was \$1,800. U. S. equivalent. This supported all activities and a personnel unit of one classified and 16 unclassified positions. The equipment consisted of four launches and one RICP Piper aircraft. By 1964 the total budget amounted to \$1,693,500. U. S. equivalent, supporting an organization comprised of 1,505 positions: 41 classified, 304 unclassified and 660 labor. The equipment at this time consisting of the following: three steamers, four houseboats, one tug boat, one mobile workshop, 16 Unimog spray applicators, three Land Rover vehicles, nine trucks, two aircraft loading trailers, two Cessna and three Piper aircraft.

In 1963 RICP aircraft control-sprayed approximately 4,500 acres of water hyacinth. In 1964 there were 49,200 acres of water hyacinth treated of which only 1,900 were actually sprayed by RICP. This is a demonstration of the continuation of RICP programming toward a more self-sufficient Sudanese Aerial Unit. With RICP in an advisory capacity and a parallel development of the pilot training program, the water hyacinth project will offer increasing opportunities for on-the-job spray training. Progress of the pilot training program has been slow due to a number of interruptions over the past 12 months. However, three Sudanese trainee pilots show reasonable progress and it is expected that they will qualify as spray pilots. To further augment the water hyacinth program, GOS has purchased new ground, water and aerial equipment to service the needs of the operational field crews. One such item has been the purchase of a large power boat and the rental of an accompanying barge. This accommodates crew living quarters and the storage of chemicals for field use. In addition, two loading trailers were constructed and full-time crews were hired and trained to handle this equipment. As a result aircraft insecticide

loading time has been cut 75 percent. RICP advisement has implemented this and other achievements toward making a more efficient water hyacinth program.

Presently RICP pilots are training two Sudanese pilots in actual water hyacinth spraying. It is expected that most of the future control spraying will be executed by the Sudanese trainee pilots during the course of instruction. RICP is attempting to promote staff training in maintenance of aerial and ground equipment under field conditions. RICP is also currently developing an improved staffing pattern in the aerial unit and encouraging the use of a two-way radio system in their spray operations. The latter needs implementation through purchase items.

RICP is continuing tools and equipment inventory assistance in pilot and ground crew training, airstrip selection, spray area planning and field campaign planning.



X SUMMARY OF INSECT CONDITIONS - 1964

AFGHANISTAN, X

By E. R. Millet

Cereal and Forage Insects

There was no breeding or invasions of DESERT LOCUST (Schistocerca gregaria) in Afghanistan during 1964. GRASSHOPPERS (Dociostaurus sp.) and (Calliptamus sp.) were numerous in the vicinity of Jalalabad and Sarobi in the eastern part of Afghanistan, and at Herat in the west. Some areas were sprayed for these pests. The normal ITALIAN LOCUST (Calliptamus italicus) and MOROCCAN LOCUST (Dociostaurus moroccanus) campaign controlled both hoppers and adults on an estimated 28,000 acres in the northern provinces during the spring and summer months. CORN GROUND BEETLE (Zabrus tenebrioides) was reported for the first time in Afghanistan in April. It was found damaging an estimated 5,000 acres of wheat at Chari-i-Kar, forty miles north of Kabul, and at Ghazni, ninety-five miles south of Kabul. Damage is done by the larvae feeding on the roots and lower stems. A comprehensive survey for the SENN PEST (Eurygaster integriceps) in Maimana Province during late April and early May revealed an extremely light infestation. A total of 5,214 sweeps in 168 locations revealed only two adult specimens. IMPORTED CABBAGE WORM (Pieris rapae) was heavy on alfalfa plantings in the Helmand Valley. BEAN BUTTERFLY (Lampides boeticus) did considerable damage to alfalfa fields in the Helmand Valley.

Fruit Insects

Numerous infestations of BLACK-VEINED WHITE BUTTERFLY (Aporia crataegi) were reported from Shebarghan and Mazar-i-Sharif Provinces during April. It was also reported doing severe damage in the areas of Akcha and Khan-i-gah. TERRAPIN SCALES (Lecanium spp.) were very heavy during the spring on peach, almond, apple, pear, and plum, in Kabul, Wakan, and Ghazni Provinces. Small limbs were sometimes covered solid with scales for one or two feet. ERMINE MOTH (Hyponomeuta padella) and CODLING MOTH (Carpocapsa pomonella) were heavy on apple around Ghazni. A FRUIT TREE MITE (Bryobia rubrioculus) was extremely heavy on apple in the Kabul area during the summer. APPLE APHID (Aphis pomi) and Anuraphis mali were heavy on apple throughout the fruit growing areas of Afghanistan.

Vegetable Insects

A moderate infestation of CUTWORM (Agrotis sp.) was observed damaging young cabbage, radishes and other vegetables on the Ministry Shisham Bagh farm in Jalalabad in April. About ten percent of the cabbages were also heavily infested with CABBAGE APHID (Brevicoryne brassicae).

About ten percent of these same cabbages were very heavily infested with the LARGE WHITE BUTTERFLY (Pieris brassicae). TWO-SPOTTED SPIDER MITE (Tetranychus telarius) was extremely heavy at the Bolen farm near Bost on melons, squash, pumpkin and watermelon. They were also extremely heavy on safflower, sesame and bush bean. BALUCHISTAN MELON FLY (Myiopardalis pardalina) had a much reduced population in the Helmand Valley compared to the past three years. This was probably due to the extremely cold winter with recorded temperatures of 13°F.

Citrus Insects

CITRUS PSYLLID (Diaphorina citri) was observed in heavy populations in orange groves at Laghman in April. They were moderate at Jalalabad in April and August. CITRUS LEAF MINER (Phyllocnistis citrella) caused considerable damage on the new growth of young citrus in nursery plots at Jalalabad. CITRUS WHITEFLY (Dialeurodes citri) and a MITE (Eutetranychus orientalis) were moderate on citrus in September at Jalalabad.

Cotton Insects

CUTWORMS (Agrotis spp.) were again a problem in young cotton plantings in the Helmand Valley. Many farmers had to replant skips and damaged hills three and four times. SPINY BOLLWORM (Earias insulana) apparently had a much lower population this year, the highest reported being 8 percent infestation in early October. This was in all probability due to the severe winter and low temperatures during January, which must have reduced overwintering hibernation stages. A green leafworm, the larvae of the BEAN BUTTERFLY (Lampides boeticus) was observed attacking young cotton, alfalfa, jute and mung beans in the Helmand Valley. It was also reported damaging corn, cotton, vetch and sesame in the Chakhansur Basin. TWO-SPOTTED SPIDER MITE (Tetranychus telarius) was in cotton by early October. It has not been much of a problem on cotton prior to this appearance.

Forest and Shade Tree Insects

A small CICADA (Cicadatra sp.) was observed emerging in abundance on Russian olive (Elaeagnus sp.) at Darweshan in the lower Helmand Valley. Emergence holes were much in evidence on the ground under these wind-break trees. Another abundant emergence of CICADAS was observed in June along the highway north of Kabul to Char-i-Kar. Psalmochavias rugipennis, Parharia lacteipennis and Cicadatra anoea were observed south of Coriz-i-Mir for about one kilometer on the roadside acacia trees and camel-thorn bushes. Cicadatra anoea was observed numerous for about five kilometers on roadside mulberry trees at the Baghram airport road thirty miles north of Kabul. Damage was slight to the trees and the cicadas did not seem to be in cultivated areas, only along the roadside ditches. Parharia casyapae was abundant on mulberry trees in July some two hundred and twenty-five miles south of Kabul along the highway to Kandahar. TWO-SPOTTED SPIDER MITE (Tetranychus telarius) was extremely heavy on locust (Acacia) trees at Bost this summer. CLEAR-WINGED COTTONWOOD LEAF APHID (Chaitophorus

populellus) was so heavy on popular trees at Bamayan and in the Hazarajat that the trees glistened in the sunlight with honeydew, and the soil surface beneath the trees appeared to be oiled.

Field Crops

CUTWORMS (Agrotis spp.) were the main pests reported attacking sugar beets in Kataghan Province this spring. Sugarcane plots on the research farm at Bolen in the Helmand Valley were found infested with a SUGARCANE BORER (Emmalocera depressella) and a SUGARCANE STEM BORER (Argyria sticticraspis). This sugarcane stock was brought to Bolen from Jalalabad where both borers occur, and it is possible that these pests may have been introduced with the planting stock. MAIZE AND JOWAR BORER (Chilo zonellus) infested about 80 percent of the corn plantings on the Ministry Shisham Bagh farm at Jalalabad during September.

Stored Product Insects

KHAPRA BEETLE (Trogoderma granarium) was found in moderate infestations in wheat storage warehouses at Marja and Griskh in the Helmand Valley.

Insects Affecting Man and Animals

A number of homes of Americans in Kabul were infested with BEDBUG (Cimex lectularius). This pest is known to occur in at least 20 percent of the homes of the local population. A LOUSE FLY (Hippobosca longipennis) was quite annoying to dogs this summer.

Beneficial Insects

MARSH FLIES of the family Sciomyzidae, the larvae of which are specific snail-killers, particularly of snails of the genus Lymnea, were found in Afghanistan in October. This genus of snails is intermediate host for liver fluke of sheep and cattle. Sepedon sphegus, Pherbellia cinerella, Pherbellia sp. and Knutsonia turkistani were tentatively identified in a short survey from the Helmand Valley to Kabul. Sepedon appeared to be the predominate genus of flies collected. These were found at Kandahar, Nadi-Ali, Marja, and Shemalon in the Helmand Valley, and also near Mukur and Kabul. Pherbellia cinerella was collected at Kandahar; Pherbellia sp. at Ghazni; and Knutsonia turkistani at Kabul.

X SUMMARY OF INSECT CONDITIONS, 1964

ETHIOPIA

By P. M. Schroeder

Cereal and Forage Insects

A small DESERT LOCUST (Schistocerca gregaria) swarm of approximately two acres in size was seen during the middle of August. Several days later a swarm of approximately this same size was observed landing in the waters of the Gulf of Aden which apparently marked the end of this swarm. A number of other swarm reports were made, but aerial and ground reconnaissance could not locate them. Solitary forms have been reported on the Red Sea coastal plain near Massawa.

The NUTGRASS ARMYWORM (Spodoptera exempta) has not been reported this year. Heavy infestations of CATERPILLARS were feeding on sorghum in the Dessie area. Some experimental controls were carried out.

Teff in the Addis Ababa area was severely damaged by an unidentified larvae. A PENTATOMID (Agonoscelis pubescens), a COCCINELLID (Chnootribia similis) and a COREID (Cletus sp.) were found on corn at Debre Zeit.

Corn and sorghum in the Harrar area was heavily infested with an APHID and a CORN STEM BORER.

The TEFF STEM SHOOT FLY (Atherigona hyalinipennis) was observed in the Harrar area. In the Ginagera area a CICADELLID (Tettigoniella cosmopolita) was heavy on grass.

Corn in the Debre Zeit area had light infestations of MAIZE STALK BORER (Busseola fusca), A FLEA BEETLE (Blepharida sp.), A LYGUS BUG (Lygaeus pandurus), and CORN LEAF APHID (Rhopalosipum maidis).

Coffee Insects

A PENTATOMID (Antestia orbitalis) was light to medium in the Sabatta area. Two and three year old coffee trees were severely damaged by the BLACK BORER (Apate monachus) in the Mesan Tafari area.

Oil Seed Insects

Nug in the Ambo-Gheddo area was heavily infested with a CATERPILLAR. A number of other CATERPILLARS were causing minor damage. A BOLLWORM (Heliothis armigera) and an ARMYWORM (Prodenia littoralis) did extensive damage to peanuts on the eastern slopes of Eritrea Province.

Cotton Insects

Tandaho had APHIDS, JASSIDS, and A COTTON STAINER (Dysdercus sp.). At the Ghibbie River on the Jimma Road A BOLLWORM (Heliothis sp.) caused severe damage.

Fruit Insects

VEDALIA (Rodolia cardinalis) is now successfully established in Ethiopia. LEMON BUTTERFLY (Papilio demoleus) did minor defoliating at Debre Zeit and Sabata.

A SCARABIDAE was feeding in orange blossoms and causing considerable damage to rose blossoms.

WHITE FLIES were noted on figs at Debre Zeit. A ROUND HEADED BORER did considerable damage to young figs at Debre Zeit.

An APHID (Toxoptera sp. probably aurantii) was light on citrus in the Sabata area, as was A BEETLE (Carpophilus fumatus).

Truck Crop Insects

Squash in the Sabata area was heavily infested with a SOUTH AFRICAN PLANT BUG (Leptoglossus membranaceus), cabbage was medium infested with NOCTUID LARVAE (Autographa spp.), CABBAGE APHID (Brevicoryne brassicae), DIAMOND-BACK MOTH (Plutella maculipennis), and A FLEA-BEETLE (Phyllotreta sp.).

Brussel Sprouts in Addis Ababa had a heavy infestation of CABBAGE APHID (Brevicoryne brassicae). In Alemaya, brussel sprouts and cauliflower were infested with A CHRYSOMELID (Monolepta sp.) and a PENTATOMID (Eurydema ornatum).

Miscellaneous

A number of flights of TERMITES (Macrotermes natalensis) took place in the Addis Ababa area.

Hollyhocks were heavily infested by A LYGUS BUG (Oxycarenus lavaterae) and by CHRYSOMELIDS (Monolepta sp.) and (Podagrica sp.). Roses were also infested with Monolepta sp. and in the Addis Ababa area had heavy infestations of ROSE APHID (Macrosiphum rosae).

Bread flour in Addis Ababa was commonly contaminated with APHANOTUS DESTRUCTOR (Tribolium destructor).

A SATURNID (Bunea alcinae) defoliated a specific thorn bush Balanites aegyptiaca on the Hazamo Plain of Eritrea Province.

SUMMARY OF INSECT CONDITIONS - 1964

IRAN

By S. W. Wilson

Cereal and Forage Insects

A single observation of DESERT LOCUST (Schistocerca gregaria) was reported in the Jiroft area. This small swarm was red in color and covered about 50 hectares in area. Chemical control was applied and the swarm was destroyed. MOROCCAN LOCUST (Doclostaurus moroccanus) occurred over large areas in the Moghan and Kermanshah areas. Severe damage necessitated a control on 70,875 acres. Doclostaurus sp. and Calliptamus sp. were present in Mazandaran, Kermanshah, Loristan, Kurdistan and Arak in numbers, making large scale control necessary. Extensive control programs were conducted against the SENN PEST (Eurygaster integriceps) in Tehran, Isfahan, Shiraz, Kermanshah, Hamadan, and Kurdistan areas. A total of 80,500 acres were controlled by chemical application and 281 acres by biological control. Rice fields in Guilan Ostan had an infestation of ARMYWORM (Pseudaletia unipuncta). Chemical control was applied immediately and thus limited the damage. Light damage occurred to rice fields in Fars Ostan which were attacked by a PENTATOMID (Dolycoris penicillatus). A CEREAL LEAF MINER (Syringopais temperatella) caused moderate damage to wheat in Fars and Khuzestan Ostans. A NEMATODE (Anguina tritici) occurred in the Bandar Abbas area causing severe damage to wheat. The wheat in the north and northeastern Ostans was attacked by a CARABID (Zabrus morio). Severe damage occurred in the Moghan plain where up to 80 percent of some wheat fields was destroyed. Moderate damage was sustained in the Khorasan area due to a RAT (Microtus socialis). A total of 42,750 acres were controlled for this pest. ALFALFA WEEVIL (Hypera postica) was very severe in all alfalfa producing areas. A PIERID (Colias sp.) caused severe damage in the central and north central Ostans. Light to severe damage occurred to alfalfa in the central and northern Ostans which was caused by the BEET ARMYWORM (Spodoptera exigua). In Khuzestan alfalfa was severely damaged by the TOMATO CATERPILLAR (Prodenia litura). AUTOGRAPHA GAMMA (Plusia gamma) caused light damage throughout the alfalfa producing areas. In the northern Ostans PEA LEAF WEEVIL (Sitona lineata) caused minor damage to alfalfa.

Vegetable Insects

Severe infestations of BEET ARMYWORM (Spodoptera exigua) occurred throughout the sugar beet producing area. A total of 45,000 acres were sprayed for this pest. The BEAN APHID (Aphis fabae) occurred in most sugar beet producing areas, but caused only limited damage. In the Darab Valley RED SPIDER MITES caused severe damage to sugar beets. Moderate damage

occurred to sugar beets in the Karaj and Fars areas from the SUGAR BEET CROWN BORER (Gnorimoschema ocellatella).

Cotton Insects

OLD WORLD BOLLWORM (Heliothis armigera) occurred in moderate infestations in Gorgan and Mazanderan Ostans. Widespread chemical control was conducted for this pest. The BEET ARMYWORM (Spodoptera exigua) was very severe on cotton in Gorgan Ostan. A total of 20,250 acres of cotton were sprayed for control of this pest. Cotton fields in the Darab Valley were severely infested with SPINY BOLLWORM (Earias insulana) and control measures were carried out on 27,000 acres in this area. TWO SPOTTED SPIDER MITE (Tetranychus telarius) occurred in moderate numbers in Mazanderan and Gorgan Ostans. Limited areas of severe infestations of the TOMATO CATERPILLAR (Prodenia litura) on cotton was found in Khuzestan Ostan.

Deciduous Fruit Insects

OYSTERSHELL SCALE (Lepidosaphes ulmi) infestations were severe on apple trees in the Tehran area. Apple, cherry, pear, and peach trees had moderate infestations of OLIVE SCALE (Parlatoria oleae) in Tehran, Khorasan and the Meshed areas. ERMINE MOTH (Hyponomeuta padella) caused severe defoliation of apple and plum trees in Azarbaijan, Khorasan and Tehran Ostans. Tehran and Isfahan Ostans had severe infestations of SHOT-HOLE BORER (Scolytus rugulosus) on apple, cherry, peach, plum, apricot and almond trees. LEOPARD MOTH (Zeuzera pyrina) occurred in severe numbers in Tehran Ostan.

Citrus Insects

General drought conditions and a severe winter resulted in decreased SCALE populations. PURPLE SCALE (Lepidosaphes beckii), BLACK PARLATORIA SCALE (Parlatoria zizyphus), and YELLOW SCALE (Aonidiella citrina) occurred in light infestations in the Caspian Sea area. DICTYOSPERMUM SCALE (Chrysomphalus dictyospermii) occurred in heavier populations, but was of no large-scale importance. COTTONY-CUSHION SCALE (Icerya purchasi) was controlled by a predatory LADY BUG (Rhizobius debilis). TEXAS CITRUS MITE (Eutetranychus banksi) was noted in Minab, Jahrom, Shabankereh and Ahwaz. Severe reduction of fruit yield was widespread.

Nut Insects

The PISTACHIO LEAFHOPPER (Idiocerus stali) caused moderate damage to pistachio trees in the Kerman-Ghazvin area. In Damgan, Kerman and Ghazvin area the PISTACHIO NUT BORER, (Eurytoma plotnikovi) caused some damage to pistachios. The ALMOND NUT BORER (Eurytoma amygdali) infestations were heavy, resulting in severe damage to almond trees in Azarbaijan Ostan. The estimated control for all pests of pistachios was a total of 456,000 trees.

Tobacco Insects

OLD WORLD BOLLWORM (Heliothis armigera) populations were light in Guilan and Mazanderan Ostans.

Oilseed Crops

In Khuzestan heavy infestations of SESAME LEAFHOPPER (Curculifer opacipennis) resulted in severe economic damage to the sesame crop.

Stored Products Insects

The Government of Iran estimated an overall loss of 10 percent of all stored agricultural products due to insects. Loss was totaled at \$66,000,000. Among the most important pests were: the CONFUSED FLOUR BEETLE (Tribolium confusum) GRANARY WEEVIL (Sitophilus granarius), RICE WEEVIL (Sitophilus oryzae), KHAPRA BEETLE (Trogoderma granarium), and RED FLOUR BEETLE (Tribolium castaneum).

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X SUMMARY OF INSECT CONDITIONS, 1964,

SUDAN

By A. Kaatz

Cereal and Forage Insects

TREE LOCUSTS (Anacridium melanorhodon melanorhodon) infestations increased during December 1963, reached a peak in January and February 1964, and then tapered off to none for several months. Breeding occurred during the summer rains of July and August in Khartoum, Blue Nile, Kordofan and Darfur Provinces after which the population increased greatly. Successful controls were carried out during January, February and March in all affected areas, and will resume again in November and December on the new brood. It is believed two other unidentified species were present this year. Damage was reported to citrus trees along the Blue Nile near Hassaheisa and at several locations in Darfur. Damage was reported to durra fields from three different locations in Kordofan.

The TROPICAL MIGRATORY LOCUST (Locusta migratoria migratorioides) was not reported this year. DESERT LOCUST (Schistocerca gregaria) was not found until late September in Wadi Arbaat and Wadi Eit in the Red Sea Hills where small numbers of the solitary phase was widely scattered along the dry stream beds. The population may increase somewhat during the winter rains of November and December. The summer breeding range remained clear and free of desert locusts until October when three small bands of hoppers were reported near Baiyuda, about fifty miles south of Merowe, and one band near Debba south of Dongola. Control activities were initiated on these hopper bands.

The DURRA ANDAT BUG (Agonoscelis pubescens) population increased greatly over last year in the Kassala and Blue Nile Provinces. A successful spraying campaign was conducted in Kassala and Gedaref Districts during May, which is the dormant season when this insect is clustered in shady portions of trees. Many andat bugs were killed in the Dueim District during spraying for tree locust in January and February.

The GREEN DURRA BUG (Amayosana punctata) damaged a number of durra fields in the milk stage in the Gebel Dali District.

A COTTON BOLLWORM (Heliothis armigera) infested the heads of durra in a number of locations in the Gezira during February and March.

DURRA APHID (Aphis sorgi) were widespread along the White Nile River in late maturing durra. The APHIDS (Rhopalosiphum maidis) and (Longiunguis sacchari) were reported in durra fields in the Gezira. COTTON APHIDS (Aphis gossypii) were reported found on marginal rows of durra adjacent to cotton.

An infestation of MILLIPEDES in durra and dukhn millet were successfully baited in the Dueim District.

DURRA STALK BORER (Sesamia cretica) is widespread and found in almost all durra fields. No controls were attempted except at Khashm El Girba and these were not successful. In the Dongola District, where durra is cut and the stalks allowed to regrow, 40 to 60 percent of the crop was seriously damaged.

An unidentified CATERPILLAR damaging seedling stage of durra during August was reported from the Gevel Dali District.

GRASSHOPPERS of various species caused damage to durra and sesame in Khashm El Girba, Kassala, Dali, Mazoum, and at different locations in Kordofan Province. Grasshoppers damaged peanut fields in Kordofan where 4,000 acres were baited with poison bait by the cultivators.

A SPITTLE BUG on durra was reported in Gederef District during September where up to 15 percent of the stalks were infested in a number of fields.

A BEETLE (Rhinypta reflexa) was reported damaging dukhn millet in Dueim District during January. Several small fields were destroyed before the cultivators sprayed their crop.

An ARMYWORM (Spodoptera sp.) caused damage to berseem and lubia bean fields in Kassala before being controlled by spraying. Damage also caused to various berseem fields along the Nile River in Northern Province during January through May where fields were flooded with water to control the pupa stage. ARMYWORMS also caused damage to okra, potatoes and vegetable plots at Khashm El Girba before being controlled by sprays.

The APHID (Aphis sorgi) was reported in wheat plots at Khashm El Girba during January and February. Several sprayings were necessary to achieve control.

The SPOTTED ALFALFA APHID (Therioaphis maculata) and COWPEA APHID (Aphis craccivora) were serious in many berseem fields in Khartoum Province and along the Blue Nile River to Wad Medani. Aphids are usually kept in check by predators but apparently conditions were not favorable for predator development this season. Many cultivators reported the loss of their stands. Aphids were also reported serious on berseem and broad-beans in Kassala District and at Sinkat where regular spraying controlled them.

BLISTER BEETLES were serious in a number of berseem fields and in Tamar-hindi blossoms near Soba during July, and again in September.

THRIPS and WHITEFLIES seriously infested about 500 acres of peanuts during September and October at Khashm El Girba. Whiteflies were also reported in lubia beans and safflower plots during January through March at the same location. FLEA BEETLES were reported serious on kenaf trials near Tonj.

An unidentified STEMBORER was reported present in wheat fields during February and March in the Northern Province.

Fruit Insects

Infestations of a CITRUS LEAF MINER (Phyllocnistis citrella) were general in about 70 percent of the citrus orchards along the Nile River in the Northern Province, in the Blue Nile, Khartoum, and Kassala Provinces. Controls were conducted only in government orchards.

PARLATORIA DATE SCALE (Parlatoria blanchardi) and a TERMITE (Odontotermes sudanensis) are a major problem on date palms in the Northern Province. Controls were carried out only along the southern reaches of the Nile River. None were conducted in the north as this region is being flooded out due to rising of the Nile River by the High Dam.

COCCIDS (Lepidosaphes tapleyi) and (Parlatoria pseudaspidiotus), with infestations varying from severe to light, are found in practically all mango orchards. Some controls were conducted in the Northern, Kassala and Blue Nile Provinces.

A RED SPIDER MITE was reported on citrus in a number of locations in Shendi District, in Khartoum and Kassala Provinces. A number of orchards in each province were sprayed. CITRUS RED MITE (Panonychus citri) was reported in Khashm El Girba citrus plantings and sprayed several times with very good results.

Attacks by the FRUIT FLY (Pardalaspis quinaria) were reported in Guava fruit along the Nile River from Khartoum to Berber. Control work was limited to Shendi and Atbara Districts.

The HIBISCUS MEALYBUG (Phenacoccus hirsutus) was reported on Guava and Mango trees in Khartoum and Blue Nile Provinces and in the Nuba Mountains District. A number of orchards were sprayed.

A SCALE was present on olive trees in Kassala District.

Infestations of a PAPILIONID (Papilio demoleus demodocus) were numerous on lemon trees in Khartoum and Kassala Provinces and in the Nuba Mts. Few controls other than picking were reported.

SCALE insects were reported on citrus in Atbara and Kassala Districts with a number of orchards in each district being sprayed.

RED ANTS seriously infested mango and citrus trees at several locations in Khartoum and Kassala Provinces and were controlled by spraying.

WHITEFLIES were reported infesting orange blossoms in great numbers in orchards near Atbara.

SCALES and TERMITES infesting fig trees and grape vines at the Sinkat experimental plots were controlled by several sprayings.

A FRUIT FLY (Carpomyia incompleta) was found in Indian "nebbak" fruit trees near Butri during the early part of the year.

Vegetable Insects

The FRUITWORM (Heliothis armigera) on tomatoes and eggplants was the most serious pest this year. Favorable conditions enabled it to be active all year in most of central Sudan. From 5 to 75 percent of the crop in fields along the Blue Nile were lost, and 100 percent of the tomato fields were infested. Only the most progressive cultivators conducted spraying operations.

ONION THRIPS (Thrips tabaci) were again serious from January to April in most of the onion fields along the Nile River from Khartoum to Atbara, and at Bara in Kordofan Province. Many cultivators sprayed to control this insect.

MELON FLIES (Dacus ciliatus) and other (Dacus sp.) were a serious threat to all melons and cucurbits. In Khartoum District over 1,000 acres in different fields were seriously affected and crop losses ranged from 5 to 70 percent or more during the season. Cucumbers and squash crops were not seriously attacked. Another DIPTERA (Atherigona orientalis) also attacked melon fruit during January and February in Khartoum District gardens.

Various APHIDS infested melons and other cucurbits all year. Early in the year melon fields at Soba were sprayed after several fields had been severely damaged. Aphids were reported on eggplants, okra, cucumbers and melons in the Northern Province during May and on eggplants at Arbaat Wells during the period January to April. The APHID (Aphis laburni) was reported on broad beans at Kassala and sprayed during February and March.

BLISTER BEETLES (Mylabris sp., Epicauta sp. and Coryna sp.) were widespread. Damage was reported on okra blossoms in Kordofan Province during January and February and again in September. They were also reported on vegetables in Darfur Province, in most of the gardens around Soba and Khartoum during August and September, and in all flower gardens in the Nuba Mts.

The TWELVE-SPOTTED MELON BEETLE (Epilachna chrysomelina) was reported serious in melon fields at Sennar, in Darfur Province wherever cucurbits were grown and was present in most gardens along the Nile from Khartoum to Atbara.

The RED PUMPKIN BEETLE (Raphidopalpa foveicollis), usually a serious pest on bean and cucurbit crops, was not important this year.

The PENTATOMID (Aspongopus viduatus) was present in practically all melon gardens in Kordofan Province. It was serious in several localities. The SOUTHERN GREEN STINK BUG (Nezara viridula) was found on melons, other cucurbits and on tomatoes in Khartoum Province during September.

WHITEFLIES and LEAFHOPPERS were present on tomatoes, eggplants, okra and cucurbits in most areas but were not serious.

FLEA BEETLES were also present in all gardens along the Nile River in Khartoum Province. A FLEA BEETLE (Bagrada hilaris) was reported on okra in the Nuba Mts., but serious in only a few locations.

An ARMYWORM (Spodoptera sp.) was reported bad on all vegetables in Sennar District early in the year. Thirty acres of tomatoes were destroyed near Soba before being controlled. It was present in most gardens at Khashm El Girba where regular spraying was conducted.

THRIPS were reported present on almost all crops with flowers in the Bara area during August and September.

Other insects noted were RED ANTS on tomato plants at Kassala, which were sprayed and the insects controlled. RED ANTS were also reported in vegetable gardens at Sinkat. CUTWORMS were reported on vegetables in the Kassala District and NEMATODES in tomato plants at Bara. The LEAFWORM (Prodenia litura) was on tomato and crucifer plants at Sennar during February and March, and TERMITES, GRASSHOPPERS and LOOPER CATERPILLARS were reported at various places in Kassala and along the Blue Nile.

A PENTATOMID (Piezodorus lituratus) was reported in many okra fields in Kosti and Sennar Districts.

Cotton Insects

The COTTON JASSID (Empoasca lybica) was widespread and general in all cotton fields and was the most important cotton insect in the Sudan. At Zeidab approximately 6,000 acres of early cotton were sprayed in July. In the Tokar Delta the density of infestations varied in different fields. A number of fields had severe infestations and no controls were applied. The Gash Delta reported JASSIDS present in September and October. In the Blue and White Nile regions the infestations started to build up early in August and spraying started in late September. In the Gezira infestations started building up early in September with densities varying from field to field. General spraying started by the end of September. The JASSID population in the Gezira was denser in the south than in the north. This is the reverse of the usual trend. In general infestations were lighter than during 1963. By the end of the cotton growing season it is expected that an aggregate of over 1,000,000 acres will be sprayed for cotton JASSID, WHITEFLY and BOLLWORM control.

The SWEET POTATO WHITEFLY (Bemisia tabaci) was second in importance and as widespread as the JASSIDS and controls were simultaneous. Population density varied from district to district but in general were much lighter than last year in all areas. Heaviest populations occurred in the southern part of the Gezira, south of Kosti, and south of Sennar.

COTTON THRIPS (Caliothrips fumipennis) were present in many of the Blue and White Nile schemes. Slight damage to early cotton was reported in the Dueim District in September. Spotted infestations were reported from Gedared District and the Gash Delta.

A FLEA BEETLE (Podagrica puncticollis) was reported present in edges of fields early in September near Singha, Sennar, Kosti and Dueim. Some damage occurred to early planted fields in Dueim and Sennar Districts.

The COTTON APHID (Aphis gossypii), usually a late season pest, was quite early this season. Populations appeared in schemes south of Kosti during the cool weather in September and built up to where spraying was necessary. Neighboring districts also reported spraying in different locations by the first week in October.

COTTON STAINERS (Dysdercus sp.) were more numerous in the Nuba Mts. than for several years. Infestations were light but extensive. A concentrated spray program was conducted during July and August and part of September. This is the dormant season when the insects collect in clusters on certain trees. No reports were received from Equatoria where this insect is also present.

Another PYRRHOCORID (Odontopus sp.) was reported present along with the stainers in the Nuba Mts. and were sprayed at the same time.

The EGYPTIAN COTTONWORM (Prodenia litura) was reported present in early September in Kosti and Sennar Districts, but less numerous than last season.

The BOLLWORM (Heliothis armigera), due to conditions favorable for development, including many host plants during the winter, attained a rank of major importance for the first time. Infestations along the White Nile River from Dueim to south of Kosti, along the Blue Nile River in the Sennar District, and in parts of the Gezira, caused the loss of most of the first blooms in the early planted cotton. Infestations were general, but varied in density from area to area. Most of the second spraying of cotton this season was to control this bollworm.

The RED BOLLWORM (Diparopsis watersi) was serious in the Nuba Mts. where it was a major pest and infested up to 25 percent of the cotton bolls. All government fields were sprayed. It was present in the Gash Delta and at Khashm El Girba but was not serious. Also in schemes south of Sennar and Kosti and in Gedared District. Infestations are increasing in numbers each season.

The SPINY BOLLWORM (Earias insulana) was serious only in the Tokar Delta during January and February. Up to 32 percent of the cotton bolls were infested. No controls were applied. Elsewhere, most areas reported that a few could always be found. Most numerous reports were in the Dueim District and in the southern reaches of the Blue and White Nile. Very little was reported in the Gezira.

PINK BOLLWORM (Pectinophora gossypiella) is controlled each season by a cotton residue cleanup campaign and by either heat treatment or fumigation of cotton seed. They were reported present in localized spots in all regions. No reports were received from Equatoria where it is usually the major pest of cotton.

A WEEVIL (Alcidodes haemopterus) was reported damaging blooms of late cotton in three schemes in the Singha area during February and March.

A number of LEAF FEEDERS and PLANT BUGS were reported present in Sennar, Kosti and southern Gezira during the season. Populations were very spotted and varied from field to field. Reported were the NOCTUIDS (Cosmophila flava); (Acontia (Xanthodes) graellsii); and (Laphygma spp.). The MIRIDS (Campylomma angustula); (Creontiades pallidus); (Cyrtorhinus levidipennis); (Megacoelum suctellare); (Lygus vosseleri); (Nesidiocoris tenuis); (Deraeocoris sp.) which may be predacious on other Hemiptera; and (Stenotus sp.) which may be a visitor from grasses.

The COTTONSEED BUG (Oxycarenus hyalinipennis) was again present in all old stands of cotton in the breeding plots at Shambat.

The COTTON STEMBORER (Sphenoptera gossypii) caused only slight damage in the Gash Delta.

TERMITES and GRASSHOPPERS were reported from a few localities in the Kassala Province.

Stored Products Insects

KHAPRA BEETLE (Trogoderma granarium), RICE WEEVIL (Sitophilus oryzae), LESSER GRAIN BORER (Rhyzopertha dominica), RICE MOTH (Corcyra cephalonica) and ANGOUMOIS GRAIN MOTH (Sitotroga cerealella) are present in most of the older storehouses in the Sudan and especially so in Port Sudan area where they are major pests. The FLOUR BEETLES (Tribolium confusum and T. castaneum) are also considered major pests due to their very great numbers in most storehouses.

The MERCHANT GRAIN BEETLE (Oryzaephilus mercator) was found in a number of shipments of wheat products leaving Port Sudan. The MEDITERRANEAN FLOUR MOTH (Ephestia kuhniella) was present in many storehouses at Port Sudan. Reported to have been found in a shipload of sesame seeds from Port Sudan were a COSMOPTERYGID (Pyroderces rileyi) and a DRIED FRUIT BEETLE (Carpophilus latini).

The ALMOND MOTH (Ephestia cautella) was found infesting stored dates at Wadi Halfa and all dates leaving the port were fumigated during the season.

A BRUCHID (Bruchidius algericus) was found in broad beans in a number of storehouses in Khartoum North. Bruchids are usually present in most stores of sunt pods. A GROUNDNUT BORER (Caryedon gonagra) was found in peanuts stored in a Port Sudan decorticating plant.

Other insects reported in stored products were CADELLE, CIGARETTE BEETLE, SILVERFISH and COCKROACHES. PINK BOLLWORM larva were found in several shipments of cotton seed at Port Sudan.

Castorbean Insects

The Gash Delta had no serious caterpillar problems other than a few cutworms early in January which were sprayed. A SPIDER MITE (Eutetranychus orientalis) was found in two late sown fields.

A BLACK APHID was numerous in several fields of the Gash.

In the Kassala District ARMYWORM larva were found in experimental plots and sprayed. In the Gedaref District a FLEA BEETLE was severe in one variety trial while few or none were found in the other varieties. GRASSHOPPERS, WHITEFLIES, LEAFHOPPERS, TERMITES and a STEM BORER (Sphenoptera sp.) were present.

SUMMARY OF INSECT CONDITIONS, 1964

TURKEY

By F. M. Philips

Cereal and Forage Insects

During 1964 over 100,000 acres of small grain were treated to control a PENTATOMID (Aelia sp.) in Central Anatolia. For the third consecutive year the SENN PEST (Eurygaster integriceps) was at an extremely low population level with only about 1,200 acres of wheat requiring treatment in the areas east of Diyarbakir. A SCARAB (Anisoplia sp.) was found to be moderately damaging to small grains throughout Turkey, requiring the treatment of approximately 80,000 acres. Another SCARAB (Zabrus sp.) was found to be causing extremely heavy damage to wheat on the central plateau (the same area suffering heavy damage in previous years). The CEREAL LEAF MINER (Syringopais temperatella) caused localized heavy damage to wheat in Central Anatolia, Aegean coast and the Black Sea coast. A FLEA BEETLE (Phyllotreta sp.) caused isolated damage estimated at 60 percent to wheat in western Anatolia. An APHID (Cuernovaca noxious) was practically non-existent on wheat this year. Attempts have been made to discover the natural enemies of this insect without positive results. The WHEAT LEAF BEETLE (Oulema melanopa) caused light to moderate damage to small grains in the Black Sea area. There was no activity in Turkey by the DESERT LOCUST (Schistocerca gregaria) this year. The AFRICAN MIGRATORY LOCUST (Locusta migratoria migratorioides), ITALIAN LOCUST (Calliptamus italicus) and the MOROCCAN LOCUST (Doclostaurus moroccanus) caused light damage to grains in southeastern Turkey. The ALFALFA WEEVIL (Hypera postica) has caused heavy damage to alfalfa in the area east of Kayseri, Elazig and Erzincan. In fields surveyed it was rare to find a terminal that did not contain a larva. AN APHID was found to be heavily infesting tobacco in Denizli.

Fruit Insects

An ERMINE MOTH (Hyponomeuta sp.) caused extremely heavy damage to apple, plum and apricot trees throughout Turkey. Many trees were completely defoliated. Over 5,000,000 trees were treated in 1964. A LACE BUG (Stephanitis pyri) was found to be causing light to moderate damage on apples throughout the central part of Turkey. Over 120,000 trees were treated. The CODLING MOTH (Carpocapsa pomonella) was heavy throughout Turkey this year, causing as high as 100 percent damage. However, when treatments were made, control ranged from 50 percent to 95 percent effective. Over 500,000 trees were treated this year. SPIDER MITES (Tetranychus sp.) caused moderate damage to apples and pears in the northern half of Anatolia. A CHERRY FRUIT FLY (Rhagoletis cerasi) infested approximately 8 percent of the crop of

sweet cherries in the mountainous areas around Corum. The WHITE PEACH SCALE (Pseudaulacaspis pentagona) is infesting mulberry in the Black Sea area. A WAX SCALE (Ceroplastes rusci) infested fig trees in Hatay, Aydin and Denizli. Over 10,000 apple trees were treated in the Samsun area for SAN JOSE SCALE (Aspidiotus perniciosus). The CITRUS RUST MITE (Phyllocopturta oleivora) heavily infests citrus plantings throughout the citrus producing areas of Turkey. A SCALE (Aonidiella sp.) was heavy on citrus in Icel, Adana and Antalya. The MEDITERRANEAN FRUIT FLY (Ceratitis capitata) caused a loss of approximately 10 percent of the citrus in the Icel, Adana and Antalya areas. An isolated infestation was discovered in Civril county of Denizli Province on Hinap (a plant similar to Russian olive). The OLIVE MOTH (Prays oleellus) caused approximately 15 percent loss to the olive crop in the Marmara and Aegean areas. The OLIVE FRUIT FLY (Dacus oleae) caused heavy damage in Canakhale and Balikesir with only light to moderate damage being reported in the rest of the Aegean area. The OLIVE PSYLLID (Euphyllura olivina) infestation was light in the Adana, Gazientep, Hatay, and Maras region. A CURCULIONID (Rhynchites ruber) was reported to be infesting olives in the Mediterranean and Marmara Sea areas. A NUT WEEVIL (Balaninus nucum) was reported to have caused approximately 3 percent loss to the hazel nut crop along the Black Sea.

Truck Crop and Vegetable Insects

The BALUCHISTAN MELON FLY (Myiopardalis pardalina) caused isolated extensive damage to melons in eastern Turkey. The TWELVE-SPOTTED MELON BEETLE (Epilachna chrysomelina) was reported infesting melons near Siirt in southeastern Turkey. The COLORADO POTATO BEETLE (Leptinotarsa decimlineata) has spread further into European Turkey around Edirne. The preferred host seems to be eggplant. A CABBAGE WORM (Pieris brassicae) caused economic damage to cabbage in northeastern Turkey. A MOLE CRICKET (Gryllotalpa sp.) caused light to moderate damage to vegetables throughout Turkey.

Cotton Insects

The OLD WORLD BOLLWORM (Heliothis armigera) caused moderate to heavy damage to cotton in the Adana Plains region. A CUTWORM (Agrotis sp.) caused many fields of cotton in the Aegean area to be replanted. The EGYPTIAN COTTONWORM (Prodenia litura) was reported to be lightly infesting cotton in Adana and Antalya. Over 100,000 acres were treated. RED SPIDERS (Tetranychus sp.) caused economic damage to cotton on the southern coast. BEET ARMYWORM (Spodoptera exigua) caused some damage to cotton in Antalya and Balikesir. The SPINY BOLLWORM (Earias insulana) caused light damage to cotton in Antalya, Adana and Hatay Provinces.

Stored Products Insects

The KHAPRA BEETLE (Trogoderma granarium) infests most grain storage facilities in southern Turkey.

Miscellaneous

RODENTS caused heavy damage to grain crops throughout Turkey. A MILDEW (Plasmopora viticola) caused moderate damage on grapes primarily because of improper application of fungicides. TOBACCO BLUE MOLD (Peronospora tabacina) while infesting all of the tobacco growing areas of Turkey caused only an estimated 1-2 percent loss this year.

Table 1 RIPC AERIAL DESERT LOCUST CONTROL AND RECONNAISSANCE OPERATIONS - 1964

ETHIOPIA

Location	Amount Treated			Insecticide			Reconnaissance		Results and/or Remarks
	No. Swarms	No. Bands	Est. Acres	Kind	No. Gallons	Dosage	No. Flights	No. Hrs.	
Locust breeding areas							198	722:33	4,214 gals. gasoline 28 qts. oil
Total							198	722:33	

SUDAN

Locust breeding areas 11-30-63 to 9-30-64							86	241:50	Two flights in cooperation with DLCOEA
Total							86	241:50	

Table 2

RICP DEMONSTRATIONS - 1964

AFGHANISTAN

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Citrus psyllid, white fly, yellow scale	Early April Ningahar	Citrus		5,590	Endrin 0.02% Kerosene & soap 1½%	Very good
	Late May Ningahar			5,925		
	October Ningahar			7,000		
				18,515		
Total						

IRAN

Codling moth	May Guilan	Apple	100	DDT 50% WP 0.35 oz/gal.	95%
	March Nishapour				
Red spider		Apple	120	Tedion 18% EC 0.25 oz/gal.	90%
Total			220		

RICP DEMONSTRATIONS - 1964

Table 2 (Continued)

SUDAN

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Mixture of stored products pests 1/	February Port Sudan	Mixture of feeds and seeds 2/	26,000 cu. m. (storehouses)		0.12 lb. actual Malathion /1000 cu. m.	Fog applicator good control
	March Port Sudan		44,000 cu. m. (storehouses)			
	March Port Sudan		58,000 cu. m. (storehouses)			
	April Port Sudan		44,000 cu. m. (storehouses)			
	March Port Sudan	Peanuts	26,000 cu. m. (storehouses)			
	April Port Sudan	Peanuts	26,000 cu. m. (storehouses)		DDVP 0.03 lbs. actual/1000 cu.m.	Control very good 90%

1/ Angoumois grain moth, cadelles, confused flour beetles, cockroaches, corcyra moths, ephestia moths, grain beetles, khapra beetles, silverfish and rats.

2/ Beans, durra, gum, karkade, melon seeds, peanuts, oil cake and sesame.

Table 2 (Continued)

RIPC DEMONSTRATIONS - 1964

TURKEY

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Codling moth	May, June, July, August	Apple	180	2,304	DDT Sevin	85-94% 92-99%
Red spider	Afyon, Kastamonu	Apple	180	2,304	Tedion	99%
Apple scab	Eregli, Yahyali	Apple	180	2,304	Zineb	70%
Aphid	May, June Afyon, Eregli, Kasamonu, Yahyali	Apple	40	512	Tedion	100%
Total			580	7,424		

Table 3
MINISTRY AERIAL SPRAY PROGRAMS - 1964

ETHIOPIA

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Corn stem borer Corn aphid	June Harrar	Sorghum	60		10 oz. Malathion per acre	100% on aphid poor on borers Aldrin added for borer control. Late application
			10		16 oz. Malathion per acre	
			55		22 oz. Malathion plus 5 oz. Aldrin/A	
Caterpillar	September Dessie	Sorghum	500		2 lb. Malathion/A	100%
Total			625			

Table 3
(continued)

IRAN

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
<u>Eurygaster integriceps</u>	May-June Tehran	Wheat	80,500		Dipterex 1 qt./A. DDT 25% EC 2½ qts./A	85% 95%
<u>Heliothis armigera</u>	June-July Gorgan	Cotton	9,000		Toxaphene + DDT 2 qts./A.	85%
<u>Earias insulana</u>	June-July Fars	Cotton	27,000		Endrin 0.5 lb./A. Guthion 0.25 lb./A.	90%
<u>Spodoptera exigua</u>	Fars, Meshed	Sugar beets	15,750		DDT 25% EC 1½ lb. + 0.5 lbs. Demeton/A.	85%
Total			132,250			

Table 3
(continued)

MINISTRY AERIAL SPRAY PROGRAMS - 1964

SUDAN

Pest	Date and Location	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
		Acres	Trees		
Water hyacinth	Jan.-Feb. White Nile River	780		Herbicide 2,4-D	Bi-fluid oil inversion, coop. Bi-fluid oil inversion, coop. German techni- cians and Shell Chemical Co. Helicopters, coop with German technicians Helicopters, coop with German technicians
	Feb. Kosti	13		2,4-D	
	March Kosti	2,718			
	March-June Malakal	2,024			
Weaver birds	April Blue Nile River	80		Avicide Queltox	
	Nov.-Dec. Blue Nile R.	400			
Total		6,015			

Table 3
(continued)

TURKEY

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Olive Fly	Spring Aegean Marmara	Olives		635,370	Lebaycide	Unknown
<u>Aelia</u> sp.	Spring Central Antolia	Small grains	121,201		Dipterex, BHC Cotton Dust	Unknown
Total			121,201	685,370		

Table 3-A MINISTRY AERIAL RECONNAISSANCE OPERATIONS - 1964

SUDAN

Pest	Location	Number Flights	Number Hours	Results and/or Remarks
Desert locust	Port Sudan	6	16:50	Coop. with DLCOEA
	Kordafan Darfur	8	26:25	Coop with DOCLEA
	Kassala Khartoum	4	9:55	No locust swarms observed
	Kassala Northern	11	31:35	No locust swarms observed
Water hyacinth	White Nile River	51	173:50	Check river blockage
Total		80	258:35	

Table 4
RICP AERIAL SPRAY DEMONSTRATIONS - 1964

ETHIOPIA

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Pepper borer Cotton bollworm	September Gibbie River and Jimma road	Peppers Cotton	60		2 lbs. Malathion /A.	100% except border area where vegetation was too heavy
Caterpillars	September Dessie	Sorghum	2,900		2 lb. Malathion/A	100%
			200		1 lb. Dieldorm/A	98%
			200		2 lbs. Dieldorm/A	100%
			200		1 lb. Malathion/A	98%
Caterpillars	October Ambo	Nug	300		2 lbs. Malathion per acre	100%
Total			3,860			

IRAN

Old world date mite	August Shabankareh	Dates		900	Metasystox 450 to 650 gms./A.	45 to 65% Spraying was late
Total				900		

Table 4 (Continued) RICP AERIAL SPRAY DEMONSTRATIONS - 1964

SUDAN

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Tree locust	November Abraq	Forest	2,900		Dieldrin 2 oz/A.	Very good
	December Abu Seleh		2,560		Dieldrin 2 oz/A	Good
	December Abrak		2,560		Dieldrin 2 oz/A.	Very good
	December Um Inderaba		3,200		Dieldrin 2 oz/A.	Very good
	December Dueim District		2,900		Dieldrin 2 oz/A.	Very good
	December Geteina		2,560		Dieldrin 2 oz/A.	Very good
	January Um Arda		1,920		Dieldrin 2 oz/A.	Very good
	January Bombonab		320		Malathion	Equipment failure Poor
	January Es Seilat		960		Dieldrin 2 oz/A	Fair
	January Um Ruqeiba		500		Dieldrin 2 oz/A.	Very good
	January Dueim District		3,200		Dieldrin 2 oz/A.	Very good
	January Geteina		2,480		Dieldrin 2 oz/A.	Very good
Total			26,060			

Table 4 (Continued) RICP AERIAL SPRAY DEMONSTRATION - 1964

SUDAN

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres			
Water hyacinth	June and July Nile River		1,900		2,4-D + H ₂ O 4 gallons/A.	Unknown
Total			1,900			

Table 5 MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964

AFGHANISTAN

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Black-veined white butterfly	April Shebarghan	Almond Apricot Apple		4,708	E-605 (Parathion)	Good
Euproctis, aphids and lacebugs	May-June Kunduz	Fruit and Shade trees		12,365	Malathion 50% EC 2 pt./100 gals.	Satisfactory
Chrysomelidae leaf feeder	May-June Baghlan	Shade trees		10,910	Malathion 50% EC 2 pt./100 gals.	Good
Lesser ermine moth	May-June Mazar-i-sharif	Apple Apricot Almond		20,639	DDT - 75% WP 1.5 oz./tree	Good
Euproctis and Lesser ermine moth	May-June Badakshan	Fruit and Shade trees		8,795	DDT 75% WP 0.3%, Malathion 50 EC - 0.2%	Good
Leaf feeders and White butterfly	May-June Badakshan	Vegetables	178		Malathion 50% EC 1.5 pt./100 gals.	Good
Aphids	April-June Herat	Fruit trees		7,933	Malathion 50% EC 1 pt./100 gals.	Good
Aphids and Lesser ermine moth	May-July Paktia	Fruit trees		5,293	DDT 75% WP 1 lb./100 gals.	Good
Leaf miner	May-July Paktia	Citrus		2,646	Malathion 50% EC 2 pt./100 gals.	Good
Aphids, Lesser ermine moth Euproctis	May-Sept. Kabul			133,050	DDT 75 WP 1 lb./100 gals. Malathion 50 EC 1.5/100 gals.	Good
Cutworms	Summer. Kabul	Nursery trees	10		Aldrin 2 lbs./A. to soil	Excellent

Table 5 MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964

AFGHANISTAN (continued)

Pest	Date and Location	Crop	Amount Treated Acres	Trees	Insecticide Actual Dosage	Control Results and Remarks
Corn ground beetle	April-May Ghazni	Wheat	119		BHC dust 3% 15 lb./A	Excellent
	April-May Parwan		50			
Cutworms	July-Sept. Herat	Cotton	596		BHC dust 3% 8 lbs./A.	Good
Leafworms	July-Sept. Maimana	Cotton	117		DDT dust 75% + BHC dust 3%	Good
Leafworms	June Shebarghan	Cotton	82		BHC dust 3% 8 lbs./A.	Good
Thrips, Aphids	June-Sept. Kunduz	Cotton	213		Malathion, DDT 75% WP BHC dust 3%	Good
Grasshoppers	Summer Balkh		11,600		BHC dust 3% 8 lbs./A.	Satisfactory
	Summer Baghlan		202			
	Summer Kunduz		6,767			
	Summer Herat		9,115			
	Summer Shebarghan		615			
	Summer Maimana		110			
	Summer Ningahar, Sarobi		1,567			
	Summer Bamayan		116			
Total			31,357	206,339		

Table 5
(continued)
MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS -- 1964

ETHIOPIA

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Grasshoppers	January Shoa Province	Wheat Barley	100		BHC Agrocide 10%	Excellent
Cotton jassid	January	Cotton	1,500		Endrin - DDT $\frac{1}{2}$ oz. - $1\frac{1}{2}$ lbs./A.	98% control
Total			1,600			

Table 5
(continued)

MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964

IRAN

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
<u>Eurygaster integriceps</u>	May-June Tehran Kurdistan Lurestan Isfahan Gilan Fars	Wheat	80,500		DDT 25% EC 2½ qts./A. Dipterex 1 qt./A.	95% 85%
<u>Microtus sociatis</u>	May-June Azarbaijan	Wheat	42,750		Zinc phosphide and Arsenicals	90%
<u>Dociostaurus maroccanus</u>	May-June Moghan Kermanshah	Wheat	70,875		Aldrin 4 oz./A. Dieldrin 2 oz/A.	95%
<u>Saissetia oleae</u>	May-June Rudbar	Olives		100,000	Diazinon and oil emulsion	95%
<u>Heliothis armigera</u>	June-July Gorgan	Cotton	9,000		Toxaphene + DDT 20-40% 2 qts./A.	85%
<u>Earius insulana</u>	June-July Fars	Cotton	27,000		Endrin 0.5 lb./A. Guthion 0.25 lb/A.	90%
<u>Spodoptera exigua</u> and spider mite	June-July Meshed Fars	Sugarbeet	15,750		DDT 25% EC 1½ lb./A. + Demeton 0.5 lb./A.	85%
Total			245,875	100,000		

Table 5
(continued)

MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964

SUDAN

Pest	Date and Location	Crop	Amount Treated Acres	Trees	Insecticide Actual Dosage	Control Results and Remarks
Tree locust	Dec.-March Darfur	Forest	5,000		BHC	Very good
	Dec.-Jan. Khartoum		300			
	Dec.-Feb. Kassala		1,000			
	Dec.-Mar. Kordofan		5,000			
	Dec.-Mar. Blue Nile		2,000			
Dura andat bug	Dec.-May Kassala	Forest Cane	715	3,155	BHC	Very good
	Blue Nile	Vegetables Forest		800	BHC	Very good
Stainer bug	July-Oct. Nuba Mts.	Tebeldi tree		5,000 3,000	Chlordane Toxaphene	Very good Very good
Onion thrips	March Kassala	Onion	1		Rogor	Good
	January Khartoum		30		BHC	Very good
Red spider mite	Dec.-March Kassala	Fruit Castor	57	1,427	Rogor	Very good
Grasshoppers	Dec.-Jan. Kassala	Durra	200		BHC	Very good
Leaf miner	Dec.-March Kassala	Citrus	95		Rogor	Good
	Khartoum	Citrus		300	Rogor	Good

Table 5 MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964

SUDAN (continued)

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Whitefly	Dec.-March Kassala	Vegetables	96		Rogor	
		Cotton				
		Vegetables	6		DDT	Good
		Lubia bean	15		DDT	
Mealybug	Dec.-March Kassala	Cucumber	2		Exatin	
		Guava	11		Rogor	Good
Aphids	Dec.-March Kassala	Ornamentals				
		Wheat	30		Malathion	Good
		Horse beans	10			
		Horse beans	1		Rogor	Good
		Okra	1		Sevin	Very good
		Melons	1		Malathion	Very good
<u>Spodoptera</u> sp.	Dec.-March Kassala	Berseem	5		Rogor	Good
		Safflower	1		DDT	
		Vegetables	21		Sevin	
		Vegetables	6		DDT	
		Lubia and	15		Sevin	
		Horse beans				
		Berseem	3		Rogor	
Orange dog	January Kassala Khartoum	Tomato	3		Malathion	
		Citrus		10	Sevin	Very good
		Citrus		80	Rogor	

Table 5 MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964

SUDAN (continued)

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
<u>Heliothis sp.</u>	Jan.-March Kassala	Tomato	2		Rogor	Very good
		Tomato	5		Malathion	
		Tomato	8		DDT	
		Cotton	2		Sevin	
	Khartoum	Tomato	3		Sevin	
Scales	Dec.-March Kassala	Fruits	107		Rogor	
	May Kassala	Olives			Malathion	
	Dec.-June Nor. Prov.	Figs	3			
		Mango		3,000	Rogor	
		Citrus		1,000		
		Date Palm		50,000		
	May Kassala	Grapes	1		Malathion	
Mealybug	Dec.-March Darfur	Guava		300	Rogor	
		Citrus				
Termites	Dec.-Oct. Khartoum	Fruits			Rogor	
		Ornamentals		85,000		
	March Kassala	Tomato	5		Aldrin	
Melon beetle	April-June	Citrus	1		soil treatment	
	January Kassala	Figs-Grapes	5		Rogor BHC	
	Jan.-March Darfur	Cucurbits	2		Rogor	
		Cucurbits	35		Rogor	

Table 5 MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964

SUDAN (continued)

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Red ants	January Kassala	Vegetables	8		Rogor	
	June Kassala	Fruits	48		BHC	
Cutworms	January Kassala	Castor beans	10		BHC	
	May-June Kassala	Tomato	10		Malathion	
Sudan bollworm Egyptian bollworm	January Kassala	Cotton	10		Toxaphene	
Fruit flies	Dec.-Sept. No. Prov.	Guava		1,500	Rogor	
<u>Sesamia cretica</u>	January Kassala	Corn	1		Dieldrin	Poor
Melon flies	March Khartoum	Melon	3		Rogor	
Blister beetles	Dec.-April Darfur	Vegetables	30		Rogor	
Total			14,924	154,572		

Table 5 MINISTRY OF AGRICULTURE CONTROL OPERATIONS AND DEMONSTRATIONS - 1964
(continued)

TURKEY

Pest	Date and Location	Crop	Amount Treated		Insecticide Actual Dosage	Control Results and Remarks
			Acres	Trees		
Red spider	Winter 63-64 Central Antolia	Apple Pear		1,210,230	Winter wash	Good
Anisoplia sp	Spring and Summer	Small grain	77,191		Sevin, BHC, DDT, Cotton dust	Unknown
Total			77,191	1,210,230		

Table 6 PLANT PEST CONTROL EQUIPMENT IMPORTED - 1964

AFGHANISTAN

<u>Article</u>	<u>Source and No.</u>		<u>Agency Importing</u>		
	<u>U. S.</u>	<u>Other</u>	<u>USAID</u>	<u>Ministry</u>	<u>Other</u>
Hudson pumping unit	1		X		
John Bean pumping unit	3		X		
John Bean 15-gal. power sprayer	1		X		
Hudson 15-gal. power sprayer	1		X		
Back-pak power sprayer	3		X		
2-man portable power duster	10		X		
Laboratory equipment		X		X	

ETHIOPIA

Plastic knapsack sprayer - approx. 3-gal. tank		13		X	
Bedford 2-ton trucks w/4-wheel drive		15			X
Redifon radios Double sideband semi-portable		116			X

IRAN

Knapsack sprayers		3000		X	
Wheel-barrow sprayers		50			X
Piper PA-18 airplanes	5			X	

Table 6 PLANT PEST CONTROL EQUIPMENT IMPORTED - 1964
(continued)

SUDAN

<u>Article</u>	<u>Source and No.</u>		<u>Agency Importing</u>		
	<u>U. S.</u>	<u>Other</u>	<u>USAID</u>	<u>Ministry</u>	<u>Other</u>
Vehicles - 4-whl. drive		32		X	
Mobile workshop		1		X	
Vehicles - other		7			X
Sprayer - high pressure nozzle		34		X	X
Sprayer - exhaust nozzle		26		X	
Radio - mobile sets		10			X
Generator for radios		10			X
Sprayer - low pressure		230		X	X
Sprayer - hand operated		1085		X	X
Dusters - hand operated		210		X	X
Respirators		24		X	

TURKEY

Motorized backpack atomizer			
Motorized sprayers			
Motorized dusters			
Electric atomizer		13,028	X
Knapsack Sprayers	1,411		X

Table 7

PESTICIDES IMPORTED - 1964

AFGHANISTAN

	Imported from U. S.			Imported from Other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
	100	100	100	100	100	100
Insecticide (Formulation & Strength)	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons
Zinc phosphate					1	
Wettable sulfur					10	
Cupravit (copper oxychloride)					2	
Total					13	

Table 7 (Continued)

PESTICIDES IMPORTED - 1964

IRAN

	Imported from U. S.			Imported from Other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
	100	100	100	100	100	100
Insecticide (Formulation & Strength)	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons
Arsenate of lead						4.23
Aldrin 40% WP						2.25
Aldrin 20% E.C.						3.17
Bygon Grain						2.16
BHC 13% WP					15.20	64.38
BHC WP 12%			31.63			
Castrix						1.56
Ceresan (Mercury)						187.26
Cupravit						1.02
Dimethoate 40% E.C.					49.76	
Dimethoate 20% E.X.					28.25	
DDT (technical)			5.2			
DDT 75% WP			22.5			
DDT 25% E.C.		107.2			100.00	191.14
DDT & BHC E.C.		80.2				

Table 7 (Continued)

PESTICIDES IMPORTED - 1964

IRAN

	Imported from U. S.			Imported from other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
	100	100	100	100	100	100
Insecticide (Formulation & Strength) Gals. Tons Gals. Tons Gals. Tons						
DDT and Toxaphene E.C.		250.00	944.83			
DDT 30% E.C.+Lindane E.C.9%				2877.00		395.55
DDT 30% E.C.+Lindane E.C.20%						47.54
DDT 30% E.C.+Lindane E.C.25%						20.00
Diazinon E.C.						7.88
Oleo Diazinon E.C.						2.50
Dipterex 80% SP				3895.73		52.31
Endrin 19.5% E.C.				311.54		37.78
Erysate						3.37
Gusathion WP						6.75
Gusathion A E.C.				562.40		18.25
Gusathion M E.C.						80.12
Herbicides			0.38			0.41
Home insecticides Aerosol*						

Table 7 (Continued)

PESTICIDES IMPORTED - 1964

IRAN

	Imported from U. S.			Imported from Other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
	100	100	100	100	100	100
Insecticide (Formulation & Strength)	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons
Imikron 20% E.C.						2.55
Kelthane						0.005
Karatan			1.68			
Lindane 25% WP			1.02		695.34	15.86
Lindane 100% Tech.						2.41
Lindane 50% WP						4.50
Malathion 40% E.C.			34.34		562.40	147.84
Malix combi E.C.						5.00
Metaldehyde						0.11
Maneb						0.90
Metasystox 25% E.C.					790.25	530.22
Methyl bromide						8.25
Pomarsol						1.01
Paradi chloro-benzine						3.37

Table 7 (Continued)

IRAN

	Imported from U.S.			Imported from Other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
Insecticide (Formulation & Strength)	100 Gals. Tons	100 Gals. Tons	100 Gals. Tons	100 Gals. Tons	100 Gals. Tons	100 Gals. Tons
Pharside Arsenic						25.58
Pirter Composite						0.08
Photermox E.C.						2.40
Petroleum Oil			616.74			5.29
Ratafine			0.11			
Sevin 85% WP		3.37	57.55			
Sulphur WP			34.29			
Sulphur WP						89.30
Toxaphene 60% E.C.			0.375			5.00
Toxaphene 60% E.C. & Aldrin 40% E.C.						10.00
Tedion V18 E.C.				125.13		17.57
Tivdan 35% E.C.						12.50
Vapan						32.40
Zilio Grain						0.49
Zilio Paste						2.19

Table 7 (Continued) PESTICIDES IMPORTED - 1964

IRAN

	Imported from U. S.			Imported from Other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
Insecticide	100	100	100	100	100	100
(Formulation & Strength)	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons
Zineb						69.75
New Pesticides for testing E.C.			0.45			0.48
New Pesticides for testing Powder			0.23			0.22

Totals for Iran

	Imported from U. S.			Imported from Other Countries		
	100	Tons	Cans	100	Tons	Cans
	Gallons			Gallons		
USAID						
Ministry	250	190.77		5712.52	4491.63	
Other	1597.52	154.21	* 11	1348.88	584.885	*9500

Table 7 (Continued)

SUDAN

	Imported from U. S.			Imported from Other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
Insecticide	100	100	100	100	100	100
(Formulation & Strength)	Gals.	Tons	Gals.	Tons	Gals.	Tons
Abavit (Mercury) and Dieldrin seed dressing					35	75
Albolineum (white oil)				3.6		
Aldrin						13
BHC						250
DDT				400	1650	70
Dipterex					0.5	
Diazinon						6
DDVP				0.5		10
Dieldrin					1	35
Dieldrin				130		400
Endrin			150			300
Ethylene dichloride and carbon tetrachloride					20	

Table 7 (Continued) PESTICIDES IMPORTED - 1964

SUDAN	Imported from U. S.			Imported from Other Countries		
	USAID		Other	USAID		Other
	100	100		100	100	
Insecticide (Formulation & Strength)	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons
Queltox				16		16
Malathion				5		5
Metasystox						10
Phosphamidon				2		50
Sulfinette (sulphur)				2		
Sevin					0.5	
Thiodan		2				
Toxaphene			15			
Toxaphene + DDT + Meta parathion			5			6
Warfarin						10
Zinc phosphide						1000
2,4-D						
Total		2	170	543.1	1089	2415 469

Table 7 (Continued)

PESTICIDES IMPORTED - 1964

TURKEY

	Imported from U. S.			Imported from Other Countries		
	USAID	Ministry	Other	USAID	Ministry	Other
Insecticide	100	100	100	100	100	100
(Formulation & Strength)	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons	Gals. Tons
Insecticides *				24,109**		3,738
Total				24,109		3,738

* No breakdown of insecticide names available

** Total insecticide produced in Turkey.

Table 8 PLANT PROTECTION IN-SERVICE TRAINING - 1964

Country	Type of Training	Date and Locality	Number Trainees	Subject and Remarks
<u>AFGHANISTAN</u>	Short Course	March 2-9 Kabul	43	Plant protection and entomology
	Short Course	March 14-19 Bost	12	Plant protection and entomology
Total			55	
<hr/>				
<u>ETHIOPIA</u>	Lecture and field work	July-Dec. Addis Ababa	10	Insect survey and control
Total			10	
<hr/>				
<u>IRAN</u>	Lecture and demonstration	February Isfahan	97	Pesticide rates, safety, equipment and taxonomy
		March Nishapour	42	
		Gilan	36	
Total			175	

Table 8 PLANT PROTECTION IN-SERVICE TRAINING - 1964
(Continued)

Country	Type of Training	Date and Locality	Number Trainees	Subject and Remarks
<u>SUDAN</u>	On-the-job	February Port Sudan	5	Operation and care of fog applicator
	Lectures and demonstrations	February Port Sudan	10	Desert locust reconnaissance techniques and weather. In cooperation with DLCO-EA
	On-the-job	March Port Sudan	5	Care and cleaning of fog applicator
	On-the-job	March Port Sudan	5	Care and operation of fog and mist applicators
	On-the-job	April Port Sudan	5	Care and operation of fog and mist applicators
	Lectures and demonstrations	July Khartoum El Obeid El Fasher	15	Desert locust reconnaissance techniques and weather in cooperation with DLCO-EA
Total			45	

Table 8 PLANT PROTECTION IN-SERVICE TRAINING - 1964
(Continued)

Country	Type of Training	Date and Locality	Number Trainees	Subject and Remarks
<u>TURKEY</u>	Lecture and demonstration	March Denizli	11	Insect survey
	Demonstration	May, June Kastamonu	49	Codling moth, apple scab
	Demonstration	May-August Yahyali	37	Codling moth
	Demonstration	May-August Eregli	110	Codling moth, red spider
	Lecture and demonstration	June Izmir	16	Insect survey
	Demonstration	May-September Afyon	71	Codling moth, red spider
	Lecture and demonstration	June Izmir	41	Tobacco blue mold
	Lecture	August Ankara	7	Insect survey
	Lecture and demonstration	September Denizli	46	Seed preparation
Total			378	

Table 9

PILOT AND MECHANIC TRAINING - 1964

Country	Type of Training	Number of Trainees	Duration of Training	Remarks
ETHIOPIA	Pilot From student-pilot to commercial-pilot	2	7 months	Training terminated on or about September 30, 1964. Pilots were given aerial spray training which included both simulated and actual spraying techniques in control of insect pests.
Total		2		
IRAN	Commercial pilot	5	4½ months	Sent to Karachi, Pakistan by GOI
	Mechanic	1	6 weeks	Sent to United States by GOI
	Mechanic	1	4½ months	Sent to Karachi, Pakistan by GOI
Total		7		

Table 9 PILOT AND MECHANIC TRAINING - 1964
(Continued)

Country	Type of Training	Number of Trainees	Duration of Training	Remarks
<u>SUDAN</u>	Flight instructor's classroom instruction	4	1056 hrs.	2 passed written flight instructors test
	Commercial pilot classroom instruction	7	1406 hrs.	6 passed written exam
	Agricultural spraying Classroom instruction	4	480 hrs.	
	Commercial pilot preflight - post-flight instruction	7	1100 hrs.	
	Commercial pilot flight instruction	7	595 hrs.	4 passed flight test
	Aerial spray flight training	5	211 hrs.	
	Aerial spraying preflight & post-flight instruction	5	315 hrs.	
	Reconnaissance (locust) flight training	7	323 hrs.	
	Reconnaissance pre-flight & postflight ground instruction	7	600 hrs.	
	Reconnaissance - classroom instruction locust control and weather data gathering	7	288 hrs.	Cooperation with DLCOEA
	Ground instruction classroom instruction	2	200 hrs.	2 passed
Total		62	6574	

Table 10

PARTICIPANT TRAINING - 1964

Origin	Name of Participant	Country to Which Sent	Duration of Training	Type of Training
<u>AFGHANISTAN</u>	Anwar Sadek	W. Germany	2 years	Practical plant protection
<u>SUDAN</u>	Ahmed Hassan A/Latif	USA	12 months	Entomology
	Hassan Abbas El Tom	USA	12 months	Entomology
	Abdel Moniem H/Karrar	USA	12 months	Entomology Research (Locust Control)
	Musa Saeed Musa	USA	12 months	Entomology
	Mohamed Osman Nurein	USA	12 months	Entomology
	El Rashid El Sheikh El Sayed	USA	12 months	Entomology
	Abdel Gadir Ali Mohd Ali	USA	4 months	Plant Quarantine
	Mohamed El Fatih Zeyada	USA	4 months	Plant Quarantine
	Abdel Latif Ali Zeroug	USA	Awaiting call forward	
	Fathi A/Gadir Humeida	USA	Awaiting call forward	
	Saad Mahmoud El Faki	USA	Awaiting call forward	
	Mohd A/Wahab Mohd Ali	USA	Awaiting call forward	
	Khogali Mirghani	USA	Awaiting call forward	
	Abdalla Ali Abdalla	USA	Awaiting call forward	
	George Barsoum Salama	USA	Awaiting call forward	

Table 10
(Continued)

PARTICIPANT TRAINING - 1964

Origin	Name of Participant	Country to Which Sent	Duration of Training	Type of Training
<u>TURKEY</u>	Ibrahim Gumussuyu	USA	12 months	Insect survey
	Mine Tuncyurek	USA	12 months	Fumigation techniques
	Nocdet Kavut	USA	24 months	Insect taxonomy
	Muzaffer Cakillar	USA	2½ months	Khapra beetle
	Talat Aksoy	USA	2½ months	Khapra beetle
	Semsi Copur	USA	2½ months	Khapra beetle
	Tarik Esin	USA	2½ months	Khapra beetle
	Suheyila Gul	USA	24 months	Insect taxonomy
	Muazzez Kalkan	USA	12 months	Stored products pests
	Haci Celik	USA	12 months	Weed control
	Suna Sonmez	USA	12 months	Weed control

Table 11

PLANT PEST CONTROL FUNDS - 1964

Breakdown of Expenditures	USAID Dollars	Ministry Dollar Equivalent
<u>AFGHANISTAN</u>		
Ministry of Agriculture		
Plant Protection budget		
Salaries, administration, chemicals & control operations		
Kabul		\$ 16,271
Provinces		27,329
Ministry U.S. dollar budget		
Kabul		\$ 26,500
Provinces		<u>500</u>
Total		\$ 27,000
<u>ETHIOPIA</u>		
Ministry of Agriculture		
Pest control funds		<u>\$500,000</u>
Total		\$500,000
<u>IRAN</u>		
Government of Iran		<u>\$2,289,000</u>
Total		\$2,289,000

Table 10
(Continued)

PLANT PEST CONTROL FUNDS - 1964

Breakdown of Expenditures	USAID Dollars	Ministry Dollar Equivalent
<u>SUDAN</u>		
Plant Protection - estimated		\$ 1,708,000
Water hyacinth - estimated		1,372,000
AID - Participants	\$ 62,530	
RICP - aircraft tools and training aids	12,500	
Total	\$ 75,030	\$ 3,080,000
<u>TURKEY</u>		
Equipment	\$ 4,000	\$ 691,293
Insecticides		2,128,217
Participant trainees	55,000	41,800
Pest Control campaign (include demonstrations)		1,001,671
Salaries and other expenses		4,797,223
Total	\$59,000	\$ 8,660,204

